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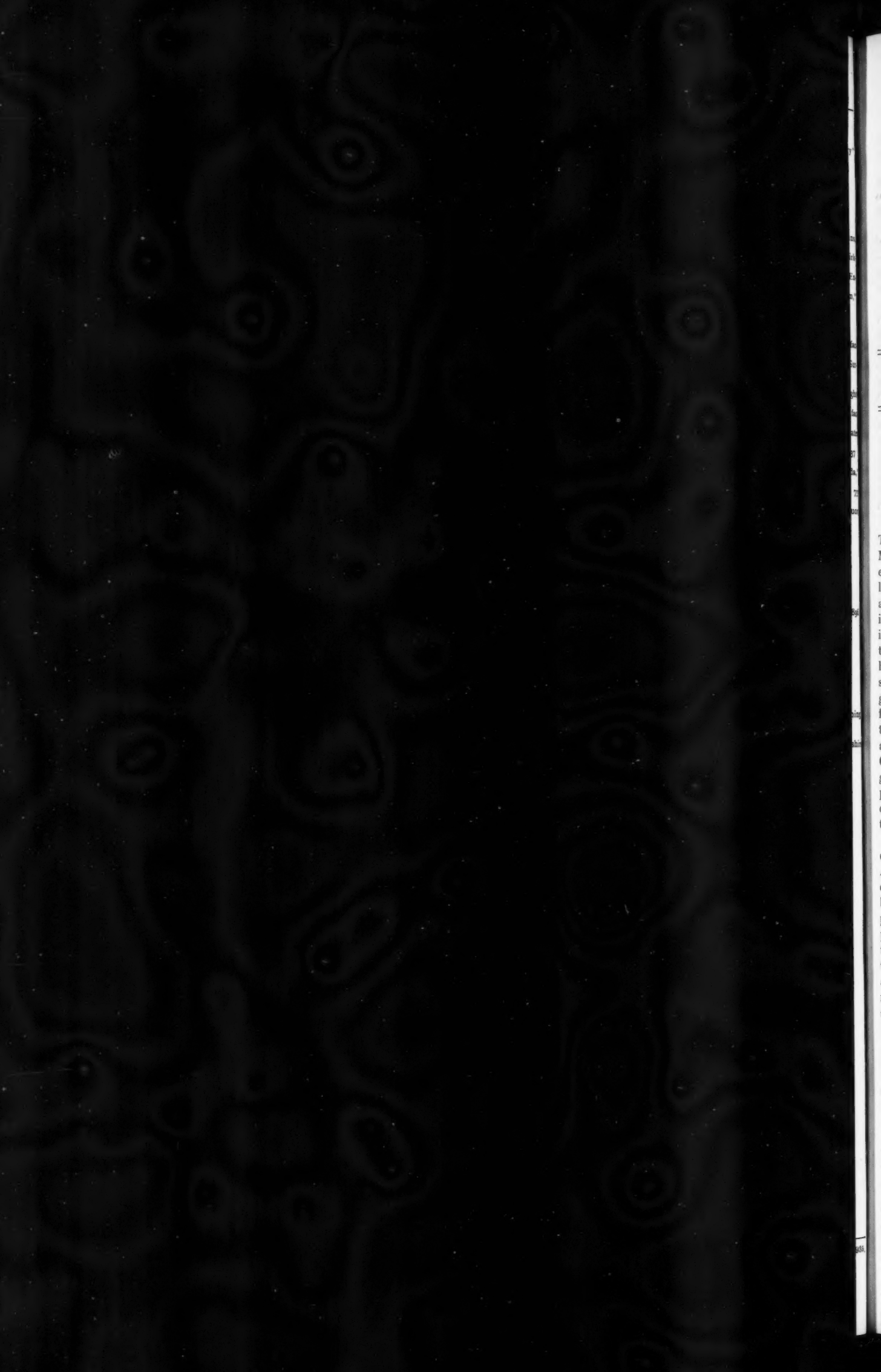


Gas Journal

OCTOBER 3, 1934

Vol. 208. 86th Year No. 3724

Editorial Notes

The B.C.G.A. Conference

THOSE whose job it is to organize the Annual General Meeting and Conference of the B.C.G.A. must have had every reason to be satisfied at Sheffield, where a very large attendance not only at the social functions, but also at the actual business sessions, testified to general interest sustained to the very end. What had appeared in advance a somewhat crowded programme was worked through with reasonable comfort, and everybody who had anything to say seemed to have the opportunity of saying it. The Association has, too, every reason to be grateful to the local authorities and trade organizations for their generous co-operation in providing accommodation and entertainment—a tribute no doubt to the admirable relations existing between the City and its fine Gas Company. A word of thanks is due also to the general Press for the interesting manner in which it gave publicity to the proceedings, though here again much credit is undoubtedly due to the liaison maintained by the Officers of the Association.

A feature of the meeting was, as usual, the exhibition of the literature and display material produced by the Association. The " shop " was set out this year in uncomfortable quarters, though no doubt they were the best available for the purpose. The confined space emphasized the mass of the material which the Association puts out, and one was inclined to wonder, while realizing that they probably know their own market best, whether the mass, or rather the variety, is too great. It is reassuring, however, to know that this question is in the minds of the Association, since the Manager, Mr. Rowe, said in his paper: " I favour the policy of issuing only publications which are pretty sure of a very large sale. We should, I think, concentrate on a mass effort rather than dissipate our efforts on a number of small leaflets which do not penetrate." We think there will be general agreement with this.

Gas Minded Grouping

THE Industry will be glad that the amalgamation and grouping question was well in the limelight at the Conference. Indeed, we believe that open discussion is what the matter requires more than anything else in order to clear the " atmosphere " which at present surrounds it.

Let us examine briefly what was said on the question in open meeting. Firstly, the President, in his Address, called attention to the anxiety which is being felt for the small and financially weak gas undertakings as the electricity grid spreads its tentacles in their areas. A considerable number of large-scale amalgamations have, he said, recently taken place, and the shareholders of small undertakings in other parts who wish to safeguard their capital should seek the same remedy. Colonel Stephenson pointed out how his own Company has in recent years absorbed smaller concerns, which were not by any means badly managed, but which were not in a position unaided to fight electrical competition. These suggestions by the President will be heartily endorsed by all. They indicate precisely the type of amalgamation which everybody wishes to see—the strong undertaking extending its protection to any weaker ones about it, and the latter not making fusion impossible by asking for ridiculous terms.

It is exactly to this type that Mr. William Cash later gave his unqualified approval, and the very good name of " physical amalgamation." He also approved of another type which he described as amalgamations for the joint working of similar undertakings, whereby they obtain larger experience and staff, and other advantages. But, he said, there is another class of amalgamation which is causing anxiety in the Industry, which, for want of a better term, he calls " financial combination." Smaller undertakings are being subjected to temptation from outside sources that hitherto have not concerned themselves with the Gas Industry, and Mr. Cash fears that real difficulty is arising in some cases. Hitherto the whole policy of Gas Industry finance has, in his opinion, been exceptionally and remarkably clean. There has been no company promoting, and no attempt to make the Industry yield promoters' profits; but now there is just some danger of such combinations as are required being carried through, not in the interests of the Industry, but in the interests of persons anxious to make money by financial transactions. Any attempt to force up improperly the distribution of profits is, of course, countered by the protection given to gas undertakings by Act of Parliament, but over-capitalization, by the addition of preliminary expenses or promotion profits, must impose a burden on any undertaking which would be to its detriment for years to come.

With these views Sir David Milne-Watson heartily agreed. It is absolutely essential, he urged, that a

holding company be gas-minded, and this was one of the chief reasons which had led the Gas Light and Coke Company to take an interest in the Kent combine. Any suggested operation must be kept thoroughly sound in every direction, financial or otherwise, and Sir David hopes that those who may be tempted in any way to yield to financial interests will preserve a tight upper lip and refuse offers which in the end would only harm them and the Gas Industry. The only comment upon which we would make is that it requires an exceedingly stiff upper lip to examine in the light of the Gas Industry in general an offer to buy one's shares at a price considerably higher than has ever been paid for them in the past.

Customer Satisfaction

ONE fact emerges quite clearly from all of this—that it is generally agreed that amalgamations of one kind or another would be advantageous in many cases. In our endeavours to discuss the question from time to time in these columns, we have received singularly little open support from the holders of whatever views. We are, however, taken to task by one correspondent who is satisfied that matters are proceeding on the right lines (though we have no authority for giving any of his views as officially held by the group promoters) for referring last week to " the suspicions so widely held in the Gas Industry that finance has been, and continues to be, the prime mover." Does anybody, he asks, put his surplus capital into, for instance, a radio firm with the sole idea of providing the people with the joys of a wireless set? Did the present shareholders of gas companies make their investments because they were burning with a religious desire to provide the consumer with gas? And if they spend sleepless nights wondering whether the consumer's gas fires are giving satisfaction, is it, he asks, pure humanity which inspires their thoughts? *Of course* it is finance, he says in effect, and how else will you achieve amalgamations good, bad, or indifferent?

But, while he recognizes that those who are forming groups are not doing so purely for their own health or that of the Industry, he asserts they are clever enough to realize that the Gas Industry has run its successful career on the broad principle of customer satisfaction, and the promoters are anxious to continue on this principle for the reason—selfish if you like, but at least human nature—of safeguarding their own capital.

This is sound enough reasoning, and there can indeed be little doubt that the gas interests which are involved in the groups at present operating are fully capable of looking after consumers' well-being. Are they " in for life," and are the purchases they are making of a nature which has been described as " haphazard," or are they part of an orderly scheme which will yield the benefits for which they hope? These are the questions which are being asked, and to the second the promoters would no doubt reply that they have too much respect for their own capital to work without a definitely conceived end in view. The unfortunate thing is that, for obvious reasons, plans cannot be disclosed.

Can we not have a debate on the whole question? If a team of groupers would meet a team of anti-groupers, the " JOURNAL " would gladly state an agreed " motion before the house," and would guarantee a full report of the proceedings. If the groupers' arguments convinced the Industry, then at least it would feel better than it does at present. If not—well, at all events it would help to tighten the upper lips of those who may in future be " tempted in any way to yield to financial interests."

Central Research

A PLEA for central research into the use of gas for industrial purposes was made by Mr. Ralph Halkett in his paper to the B.C.G.A. His idea is that such research is a necessary supplement to the more specific investigations undertaken by individual gas undertakings, and that gas undertakings generally should be willing to subscribe to the formation of one central organization, the activities of which, he feels sure, would accelerate the rate of progress of gas in industry. There is, of course, a great deal to be said in favour of this suggestion, for we cannot have too much fundamental research which could be applied locally, perhaps with modifications according to the particular process in which the gas is to be used. Any such research organization would, of course, entail a staff with special qualifications, and it is interesting to recall in this connection the views of Prof. Cobb expressed at the meeting of the Institution of Gas Engineers last June. The qualifications included adequate training in combustion engineering and chemistry; and considerable mental elasticity is essential. Prof. Cobb believes that if the applications of gas in industry are to be much further advanced, a specialist corps should be created.

Meanwhile, we are certainly on the right lines in the scheme of co-ordinated Gas Development Centres with a Central Information Bureau—undoubtedly one of the best advised moves ever made by our Industry. And it is most important that all undertakings should join in the national effort to increase the industrial load. Sheffield is one of these Industrial Development Centres, and Mr. Halkett mentions that a great deal of use has already been made of the Industrial and Research Staffs of the Sheffield Gas Company, whose services have been called upon for many varied heating processes. But he thinks that a central organization would support and amplify the work of the Industrial Centres now operating and would give the necessary degree of completeness to the form of service being attempted by the various Centres. This is certainly a matter to which close consideration should be given.

Mr. Halkett's paper outlines the work and organization of the remarkably efficient Industrial Section of the Sheffield Gas Company, the activities of which have developed an industrial load representing well over 60% of the total output of gas by the Company. This specialist Industrial Section is not, of course, of recent formation, though of late years its development has been great. As a matter of fact, the Company has had a practical demonstration room during the whole of its thirty years' activity in industrial heating. With the increased intricacy of the modern steel and metal industries and the problems of correct heating and processing becoming more exacting every day, the setting-up of a Research Department working in conjunction with the Industrial Department was essential. With the competition which obtains to-day, rapid action is needed, and such action demands technical and expert knowledge; and Mr. Halkett believes in the co-operation of practical men experienced in the application of gas to the local industries with men with suitable technical training in the subjects relative to the local industries and trades and having essentially a fundamental knowledge of chemistry. This, in fact, is the policy pursued to such good effect by the Sheffield Gas Company. Mr. Halkett's paper demonstrates in no uncertain manner the value of co-operation both within and without a gas undertaking. An industrial department staffed like that at Sheffield is of great assistance to the smaller firms who cannot justify the expense of maintaining their

own technical staff. These firms can bring their problems to the research departments, where they can be examined systematically and their products can be tested thoroughly.

Co-Operation with Manufacturers

GREAT stress is laid by Mr. Halkett on collaboration with manufacturers, and it is this co-operation which has led to such a remarkable development in the industrial load of the Sheffield Gas Company, and which will lead to far more extensive progress in the future. It must be admitted at once that Sheffield is fortunate in being able to supply very cheap gas—at rates which for large-scale use are competitive on a thermal basis with oil and producer gas. At the same time, price alone is not responsible for the Sheffield Gas Company's well-merited success. The advantage of cheap gas has been exploited to the full by the keen organization of the Industrial Department and the policy of co-operation with the manufacturer. As will be gathered from Mr. Halkett's paper, nothing is left undone to ensure that the manufacturer obtains the best results from the gas he uses in his furnaces. There is, for example, a special department for the maintenance of furnaces in steel works; a staff of practical men schooled in furnace construction and repairs is available at all times. This department, as the author says, has done much to maintain and develop the excellent co-operation between manufacturers and the Gas Company—goodwill which is bound to result in extended sales. A particularly interesting example of co-operation between the Company, the furnace builder, and the manufacturer is given by Mr. Halkett which solved a difficult problem encountered by a local silver firm. Again, practical demonstrations are given to local manufacturers in the winter evenings, and the popularity of these courses is evidenced by the fact that over 200 people have attended each year. Mr. Halkett shows what faith and sound planning can do, and it is fortunate for the Industry that the outcome of the work at such Centres as Sheffield is available to other undertakings not only in the particular areas, but to others, through the Central Information Bureau. Undertakings which hesitate or refuse to render this work still more effective by standing aloof from the Industrial Development Centre scheme are doing a disservice to themselves and to the Industry.

A New Tariff Scheme

THE new "domestic tariff" just introduced by the Newcastle-upon-Tyne and Gateshead Gas Company is most interesting. It is a block system embodying three factors—"assessable rooms," winter and summer consumption, and discount upon prompt payment. There are three blocks, the first block being charged at the published flat-rate price, the second at a substantial reduction, and any in excess also at a further reduced price. The amount of gas a consumer must take before the second block charge becomes operative depends on the number of "assessable rooms" in his house and also on whether it is summer or winter. For example, if there are four or less "assessable rooms," then the consumer pays during the winter months for the first 30 therms at the published, or flat-rate, price, the next 30 therms are charged at 1½d. per therm less, and any in excess at a further reduction of 0·7d. per therm. During the summer months the first block is 20 therms and the second block also 20 therms.

The amount of the first block varies directly with the number of assessable rooms. Starting from four rooms the blocks are graduated to fifteen rooms or over—from 30 therms in the winter quarter, as we have mentioned, to 140 therms, and the second block throughout the scale is the same quantity as the first block. Thus a consumer occupying a four-room house obtains quick relief—the desirability of which we have emphasized time and again in these columns—and full relief after consuming 60 therms in winter and 40 therms in summer. On the other hand, to obtain first relief a man who occupies a 15-room house must consume 140 therms, and to obtain full benefit no less than 280 therms in winter and 240 therms in summer.

The Newcastle system of charge has the great virtue of simplicity. It is not an optional scheme, but, obviously, in no case will it result in an increase in price to any consumer; and the principle of applying a reduction in price to a new form of tariff more attractive than the old flat-rate charge is without question the right one. Again, every consumer in the area supplied by the Company has an incentive to use more gas in the summer months. The new tariff, set out on a later page, will mean a reduction in the cost of gas to thousands of Newcastle consumers and is bound to prove of enormous assistance to the gas salesman and a bulwark against competition.

West's Competition

IN February last we published in the "JOURNAL" particulars of a Competition organized by West's Gas Improvement Company, Ltd.; and we suggested at the time that it should arouse a great deal of interest. Our belief that the number of entrants would be large has been fully justified; and the organizers are to be congratulated on the success of a gesture which will be of great value to our Industry. It was arranged to award substantial prizes to the writers of the best articles on Coke, Technical Control of Gas-Works, Industrial Gas, Gas in the Home, and Tar, and to devote the Mid-summer Number of *West's Gas* to publication of the prize-winning essays. This Special Number has now appeared and will be read with the greatest interest and profit "the world over."

Readers will not have forgotten the 1933 Summer Number of *West's Gas*—"Gas the World Over"—which had such an extremely warm reception. In our issue of Aug. 30 of that year we said: "The setting-up of records in the way of good achievements has always the one disadvantage that each time a fresh height is reached the task of passing it becomes more difficult. The Editor of *West's Gas* will find himself hard put to it in 1934 to beat 1933. There may be still something 'up his sleeve,' but if so he must take a big size in jackets."

The 1934 Summer Number of *West's Gas* proves that his jacket is a veritable "out-size."

Increasing Benzole Production

INTERESTING facts relative to the production of benzole and creosote from coal are contained in the Annual Report of the Secretary for Mines for the year 1933, just published from H.M. Stationery Office, and the figures given throw further light upon the growing national importance of this phase of our Industry's activities. The number of gas undertakings operating plants for the recovery of benzole has increased during the year under review, and it is estimated that the production of refined benzole at gas-works is now in the region of 6½ million gallons per annum, which compares with only

some four million gallons a few years ago. This increase has, of course, been encouraged by the preference now enjoyed by home-produced motor spirit, and this guarantee will give further stimulus to the installation of recovery plants.

The output of creosote, it may be mentioned, has also increased, and following the imposition of the tax of 1d. a gallon on imported heavy oils, this has been more extensively used as a substitute for fuel oil. It is gratifying to note that stocks, which had been accumulating since certain foreign countries ceased to take supplies, have been disposed of, and towards the end of the year there was a steady demand for creosote as a fuel for steam-raising and metallurgical purposes.

Information furnished by the coal trade gives the estimated production of refined motor benzole during 1933 as 31 million gallons, compared with 25½ millions the previous year, while the actual amount of crude benzole produced was 48 million gallons. It will thus be seen that the Gas Industry's contribution of refined benzole is only little over 20% of the country's total output. There is no doubt that the vast motoring public is becoming more favourably inclined to the use of home-produced motor fuel, and this growing demand for refined benzole should persuade many more gas undertakings to turn to benzole recovery as a profitable proposition.

The amount of crude spirit obtained from the gas produced in low-temperature carbonization plants also shows quite a remarkable increase—a matter of 311,422 gallons, or 72%. The Report indicates that the low-temperature industry as a whole has made substantial progress, and, although nine plants were in operation compared with ten in 1932, the quantity of coal carbonized showed a gain of 43%, while the output of smokeless fuel increased by 59,448 tons, or 37%. These advances are reflected in the crude spirit production figures, though it should be noted that spirit is not scrubbed from the gas at all plants. As an indication, however, of the greater efficiency in scrubbing methods, in those plants where the practice is adopted the average yield increased from 1·9 gallons per ton of throughput in the year 1931 to 2·2 gallons in 1932, and again to 2·7 gallons in the year under review. And it is confidently stated that as much as 3 gallons per ton may be expected by efficient extraction methods.

Personal

Mr. H. N. DANN has been selected by the Blackburn Gas Committee for the post of Assistant Works Superintendent in succession to Mr. G. Ogden, who, as announced in the "JOURNAL" for Sept. 19, has been appointed Works Superintendent at Doncaster. Mr. Dann is now Retort House Supervisor at the Greenbank Works, having previously served the Fleetwood Gas Company and the Stretford Gas Board.

* * *

The Secretary of the Department of Scientific and Industrial Research announces that under the Order in Council dated Feb. 6, 1928, the Lord President of the Council has appointed Sir John Cadman, G.C.M.G., D.Sc., M.Inst.C.E., and Sir James H. Jeans, D.Sc., LL.D., F.R.S., to be members of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research. Sir Arthur Balfour, Bart., K.B.E., J.P., Sir William H. Bragg, O.M., K.B.E., D.Sc., F.R.S., and the Rt. Hon. Lord Rayleigh, Sc.D., F.R.S., have retired from the Council on the completion of their terms of office.

* * *

Mr. HENRY KITCHEN, of Great Ayton, Yorkshire, Chairman of the Bishop Auckland District Gas Company and a Director of the Guisborough Gas Company, the Southbank and Normanby Gas Light and Coke Company, and the Stokesley Gas Company, Ltd., left £177,710, with net personalty £155,668.

* * *

Mr. PETER M'MILLAN, Assistant at the Sanquhar Corporation Gas-Works, and son of the Manager of the Works, has been appointed Manager of the Gas-Works belonging to Old Meldrum Town Council.

* * *

On the retirement of Mr. Robert Watson, Mr. D. T. LIVESEY, Jnr., has been appointed Public Lighting Superintendent at Doncaster.

* * *

The position of Lighting Superintendent at Bradford has now been filled by the appointment of Mr. G. E. CURRIER. The appointment was rendered necessary by the resignation of Mr. E. Crowther, who recently went to Salford as Engineer and Manager of the Corporation Gas Undertaking.

* * *

Upon leaving Blackburn to take up his duties as Works Manager to the Doncaster Gas Department, Mr. GEORGE OGDEN, Assistant Superintendent at the Greenbank Gas-Works, was the recipient of a handsome bookcase.

Forthcoming Engagements

Oct. 5.—NORTH OF ENGLAND ASSOCIATION.—Autumn Meeting at Grand Hotel, Middlesbrough, 11.15 a.m. Presidential Address of R. H. Duxbury, of South Bank, and visit to I.C.I. works at Billingham.

Oct. 5.—B.C.G.A.—South-Western District Conference at Ilfracombe.

Oct. 6.—WESTERN JUNIOR GAS ASSOCIATION.—Opening Meeting of 1934-5 Session at Bath.

Oct. 9.—FEDERATION OF GAS EMPLOYERS.—Meeting of the Central Committee, 28, Grosvenor Gardens, S.W. 1, 12 noon.

Oct. 9.—N.G.C.—Meeting of the Central Executive Board, 28, Grosvenor Gardens, S.W. 1, 2.30 p.m.

Oct. 10.—SOUTHERN ASSOCIATION (EASTERN DISTRICT).—Meeting at 28, Grosvenor Gardens, S.W. 1, 2.30 p.m.

Oct 17.—SIR ARTHUR DUCKHAM MEMORIAL FUND.—Meeting of Executive Committee at 28, Grosvenor Gardens, S.W. 1, 3 p.m.

Oct. 17.—B.C.G.A.—Executive Committee, in the Board Room, 28, Grosvenor Gardens, S.W. 1, at 12 noon.

Oct 18.—MIDLAND JUNIOR GAS ASSOCIATION.—Visit to the Works of the Sutherland Meter Company, Ltd., Witton, Birmingham.

Oct. 19.—SOUTHERN ASSOCIATION (WESTERN DISTRICT).—Commercial Meeting, Rougemont Hotel, Exeter, 2.45 p.m.

Oct. 24.—COKE SALESMEN'S CIRCLE. — Meeting at 28, Grosvenor Gardens, S.W. 1, at 2.30 p.m. Paper by Mr. E. W. L. Nicol.

Oct. 25.—COKE OVEN MANAGERS' ASSOCIATION.—Annual General Meeting and Dinner at the Hotel Victoria, London.

Oct. 25.—EASTERN COUNTIES ASSOCIATION.—Autumn Meeting at 28, Grosvenor Gardens, S.W. 1.

Oct. 26.—B.C.G.A.—Scottish Conference at Dundee.

Oct. 26.—MANCHESTER DISTRICT ASSOCIATION. — General Meeting at Midland Hotel, Manchester.

Oct. 29.—LONDON AND COUNTIES COKE ASSOCIATION.—Executive Committee, 11 a.m.; Central Committee, 12 noon; Luncheon, 1 p.m.; Third Annual General Meeting, 2.30 p.m., at Hotel Metropole, Northumberland Avenue, London.

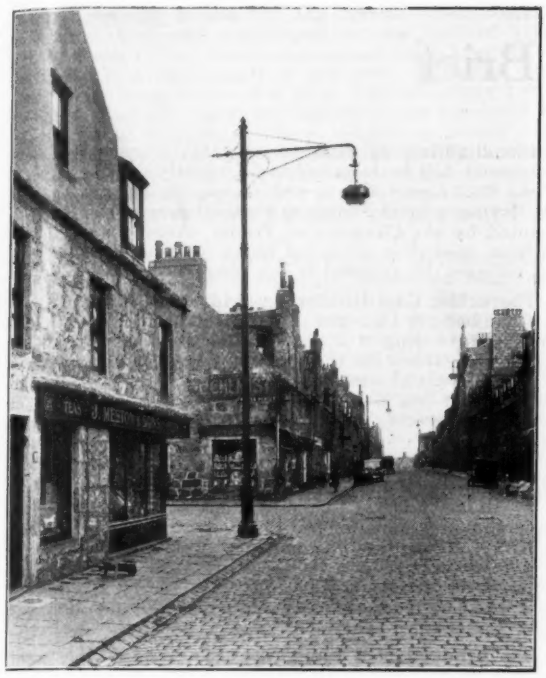
Nov. 1.—MIDLAND JUNIOR ASSOCIATION.—Meeting in Birmingham. Paper by Mr. J. A. Johnston.

Nov. 6 and 7.—I.G.E.—Autumn Research Meeting.

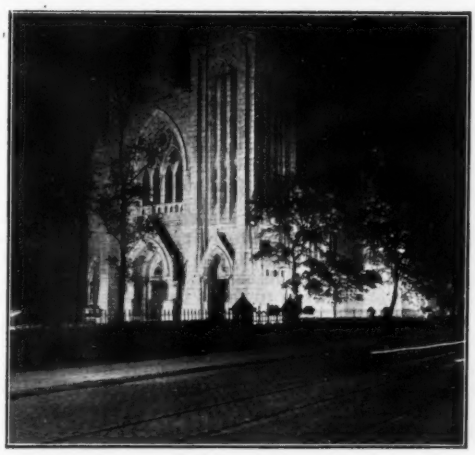
Nov. 8.—S.B.G.I.—Autumn General Meeting, Hotel Metropole, London.

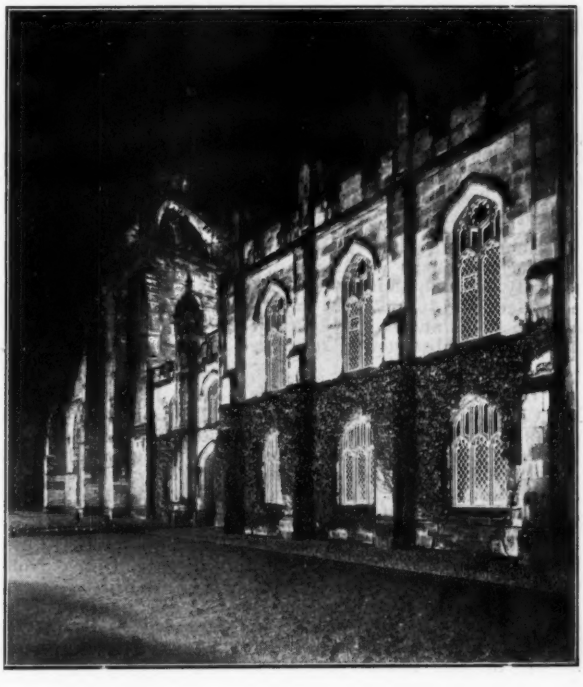
Nov. 24.—N. OF E. AUXILIARY ASSOCIATION.—Half-Yearly Meeting at Newcastle. Paper by Mr. W. O. Kirkwood.

Gas Floodlighting at Aberdeen



Our photographs give an idea of the excellent results achieved by gas lighting at Aberdeen in connection with the recent Annual Meeting of the Association of Public Lighting Engineers in that town. The two pictures above are of Chapel Street by day and night, the gas installation in this thoroughfare being referred to by Mr. Alexander Forbes in his Presidential Address to the Association, published last week. On the right is Queen's Cross Church picturesquely illuminated by gas, while below are two views of King's College, Aberdeen, similarly floodlighted. The lamps for both these installations were supplied by Messrs. Foster & Pullen, the units being similar to those referred to in Mr. Forbes' address.





News In Brief

A Lighting Contract in connection with the new Municipal Council Chamber at Hartlepool has been secured by the Hartlepool Gas and Water Company.

Ten Years' Lighting Contract.—The Hayfield Gas Company, Ltd., announce that they have made a ten years' contract with the Local Parish Council in respect of public lighting.

After being Shut-Down during the Summer the North Shields Works of the Newcastle and Gateshead Gas Company have now resumed manufacture to meet the winter demand.

The "Newhome" Cooker, a product of Messrs. Falk, Stadelmann, & Co., Ltd., took a prominent place on the decorated lorry which was entered by the Ferndale Gas Company in a recent local Carnival.

The Gas Output at Elgin during the first four months of the year 1934-35 has increased by 8·42% over the previous year. This represents an increase of 72·97% over 1928 and an increase of 112·06% over 1925.

The Coke Salesmen's Circle will meet on Oct. 24 at 28, Grosvenor Gardens, S.W. 1, at 2.30 p.m., when Mr. E. W. L. Nicol, of the London and Counties Coke Association, will read a paper on domestic coke-burning appliances.

The Third Meeting of the Sir Arthur Duckham Memorial Fund Executive Committee will be held in the Council Chamber of the Institution of Gas Engineers, at 28, Grosvenor Gardens, S.W. 1, on Wednesday, Oct. 17, 1934, at 3 p.m.

An Added Consumption of Forty Millions annually is anticipated by the Stoke-on-Trent Gas Department as a result of their obtaining an order for town gas for the firing of tiles in continuous kilns at a large tile factory in their area in place of oil firing.

£511,853 was Contributed on Poppy Day, 1933—an increase of nearly £30,000 over the figure for the previous year—and the sincere thanks of the British Legion and all ex-servicemen are due to the millions who contributed and helped in other ways towards this very encouraging result.

Cookery Demonstration at Kilkenny.—The Kilkenny Gas Lessees, Ltd., are this week holding a series of cookery demonstrations in the Diocesan Rooms, William Street, Kilkenny. Mrs. L. W. Dalby, the demonstrator, has had large and appreciative audiences and already many orders have resulted.

According to a Report lately issued by the Swiss Gas-Works Association, the production of gas in Switzerland during the first half of the current year reached a total of approximately 4,450,069,000 c.ft. as compared with 4,432,352,000 c.ft. in the corresponding six months of 1933—an increase of about 0·4%.

A Ten Days' Period of Floodlighting is being carried out by the Doncaster Corporation Gas Department until Oct. 6. The south side of Elmfield House and the gardens are illuminated by twenty units varying from 200 to 4,500 c.p. A special mantle is being used to floodlight the flowers in artificial daylight colouring.

Shock from Electric Refrigerator.—One of the dangers of refrigeration by electricity was indicated at Portswood recently when a dairy attendant, putting her hand into a refrigerator to take out some cream, received a severe electric shock and had to be removed to hospital for treatment. She subsequently recovered and was enabled to return home.

Gas Exhibition at Buckie.—Mr. J. W. Napier, M.I.Chem.E., of Alloa, opened a gas exhibition in the Fisherman's Hall, Buckie, on Sept. 18—Provost Merson presiding. The Lord Lieutenant of Banffshire was among the platform party. Mr. Napier said gas and electricity were not in competition, but in partnership in adding to the sum of modern human comfort.

We are Asked by Messrs. Hallows & Slaughter, Ltd., to announce that there will be published on Oct. 6 from their offices, 121, Victoria Street, S.W. 1, the first issue of a new paper entitled the *Gas Times*. The paper will be edited by Mr. A. C. Slaughter and managed by Mr. E. H. Hallows, both of whom are already known to many members of the Gas Industry.

Floodlighting at Halifax.—Halifax Corporation Gas Department will be responsible for nightly floodlighting of the old Bull Green House and certain other parts of the town during a local Shopping Festival from Nov. 3 to 17, promoted by the Chamber of Trade. Arrangements have also been made for extended night lighting of shop windows on specially reduced terms after closing hours.

Thorncliffe Coal Distillation, Ltd. (controlled by Newton, Chambers, & Co., Ltd.).—After allowing for depreciation and providing £10,149 for income-tax, a profit of £33,294 was earned for the year ended June 30, as against last year's profit of £49,478. One and a half years' preference dividend has been paid, absorbing £36,187, and the Directors propose to carry forward the remaining balance of £23,112.

The Co-Partnership Scheme of the Mid-Southern Utility Company continues "to break records all along the line." In his address at the annual meeting of the Co-Partnership and Hospital and Benevolent Fund on Sept. 19, Mr. R. W. Edwards, Chairman and Managing Director of the Mid-Southern Utility Company, said that good use had been made of the savings account and, due to a reduction in the price of gas, the rate of bonus will be increased during the coming year.

Gas Production in Finland.—The report of the municipal gas department of Helsingfors, Finland, for last year shows that the output of gas during the year 1933 reached a total of 809,287,000 c.ft. as compared with about 785,009,000 c.ft. in 1932, an increase of approximately 3%. The consumption of coal amounted to 63,427 tons so that the yield of gas per ton for fuel approximated 12,760 c.ft. Including the public street lighting, the average annual gas consumption per head of the Helsingfors population works out at about 4,024 c.ft.

Gas Compressing Plant is to be installed at the Wallasey Gas-Works for the purpose of providing fuel for internal combustion engines. The scheme has been prepared and carried out as an actual working test of the possibilities of the new form of home-produced motor fuel. It is intended to convert five motor lorries in the Gas Department's fleet, and the cost of compressed gas for this service is estimated to be equivalent to petrol at 9d. per gallon. The scheme will be put into operation during the next few weeks, after which a full report is to be prepared.

A Ministry of Health Inquiry was held recently at Thornton Cleveleys into an application by the local Council for sanction to borrow £10,731 for gas-works extensions and improvements. At the Inquiry the Town Clerk said the number of consumers had increased from 2,507 in 1929 to 3,286 in 1934, equal to more than 30%. Col. W. M. Carr said he was partly responsible for the design of the original gas-works at Thornton in 1908, and he recommended the provision of additional gas-making plant, together with purification and storage plant. The addition of the proposed plant would increase the capacity of the works to 300,000 c.ft. a day.

Staveley Coal and Iron Company, Ltd.—Increased profits—which are the best since 1927—are disclosed in the report for the year ended June 30, 1934. After providing for management expenses and tax provision, there remains a profit of £468,973, compared with £404,820 a year ago. Depreciation charges absorb £197,748, against £177,485, and, as already announced, the dividend is raised from 5 to 6½%. The sum of £50,000 is again transferred to reserve, and the balance carried forward is then slightly lower at £103,282. The Company has an issued capital of £3,385,356. The Directors state that the trading position shows improvement.

A Reduction in the Price of Gas is to be recommended to the West Bromwich Town Council to take effect from the December quarter. At the present time there are different rates for domestic and manufacturing purposes, but the Gas Committee has decided that the rates for all consumers shall be the same as follows: 9·4d. per therm for the first 2,000 c.ft.; 9d. for the next 3,000; 8·25d. for the next 45,000; 7·25d. for the next 200,000; 6·5d. for the next 250,000; 6d. for the next 500,000; 5d. for the next 1,000,000; 4·75d. for the next 1,000,000; 4·25d. for the next 2,000,000. The high-pressure lighting will remain at 10·7d., and through prepayment meters the quarterly charge will be 10·5d. for the first 2,000 c.ft.; 10·2d. for the next 3,000; and 9·5d. for the next 45,000.

The Gas Undertakings in Sweden, according to a report recently issued by the Swedish Gas-Works Association, remained unchanged at the end of 1933 at thirty-seven. The distribution mains had, however, been extended to a total length of just over 1,300 miles, rendering a gas supply available to a total of about 1,626,000 people. The number of gas meters in use increased to an aggregate of 409,393, of which 191,768, or nearly 47% of the total, are of the prepayment type. The annual gas consumption *per capita* of the people supplied works out at about 4,144 c.ft.; per meter installed at 12,778 c.ft.; per ordinary meter at 15,179 c.ft.; and per prepayment meter at 10,401 c.ft.

For Close Upon 100 Years the firm of William Coward & Co., Ltd., has had an intimate connection with the Gas Industry in Australia and New Zealand. The problems in these countries are, in many respects, analogous to those of the Industry in Great Britain, and a keen interest is taken by Dominion gas undertakings in developments here which affect the welfare of the Industry generally. Messrs. Cowards are a strong link between gas in the Old Country and in the Dominions, and in their recently erected and finely equipped offices at 3, St. James's Square, Piccadilly, into which they moved on Oct. 1, they have premises which, we understand, have been taken with the special object of providing a convenient headquarters for gas-works officers from overseas while visiting England.

New Steamer for Dublin.—The Dublin Dockyard Company, on Sept. 28, launched from their yard in Dublin a new steamer constructed to the order of the Alliance and Dublin Consumers' Gas Company for their cross-channel traffic. "Glencree" was the name bestowed on her by Mrs. W. J. Grey, wife of the General Manager and Secretary of the Gas Company, who performed the launching ceremony. The vessel, which has a gross tonnage of 400, has an over-all length of 148 ft. The "Glencree" is constructed of mild steel, and is considerably strengthened in excess of Lloyd's scantlings. She is of the long raised quarterdeck type, and has each hold entirely free from obstruction, giving most effective storing space. The cargo is worked from self-trimming hatches of large size, designed specially for quick loading and discharge.

Interesting Facts concerning the progress of the Omagh Gas Undertaking came to light at a meeting of the Omagh Urban Council at which a recommendation from the Finance Committee for the borrowing of a sum of £4,600 for the installation of new mains and gasholders was discussed. As far back as 1905 the Urban Council acquired the gas-works from the existing Gas Company at a cost of £35,000. A profit was shown on each year's trading until the war, when coal went up 500%. While many other concerns in the country raised the price of gas, the Omagh Undertaking was unable to do so, because under the Omagh Urban District Gas Act, 1902, the price could not be raised above 4s. 6d. per 1,000 c.ft. When the abnormal years of the war passed the works again showed a profit on each year's trading and have continued to do so with the satisfactory result that by 1945 the sinking fund created to pay for the Undertaking will be wiped off. Last year's trading profit amounted to £1,600.

Amalgamation and Grouping.

Severn Valley's Offer to Stroud Accepted.

The Severn Valley Gas Corporation announce that the offer made by them to purchase the 5% maximum consolidated ordinary stock of the Stroud Gas Light and Coke Company has been accepted by a substantial majority of the shareholders.

City and Guilds of London Examinations.

S.B.G.I. Awards.

The following is a list of the winners of prizes presented by the Society of British Gas Industries in the City and Guilds of London Institute Examinations in Gas-Works Practice, Gas Supply Practice, and Gas Fitting:

Minor Course in Gas-Works Practice.

1st Prize £5 5s. John Geoffrey Tilley. Examined at Birmingham.
2nd Prize £2 2s. Thomas Owen Glanville John. Examined at Treforest.

Minor Course in Gas Supply Practice.

1st Prize £5 5s. Athol Brown. Examined at Kirkcaldy.
2nd Prize £2 2s. Alfred Cameron Jennings. Examined at L.C.C. Westminster Technical Institute.

Final Examination in Gas Fitting.

1st Prize £5 5s. Raymond Claude Keevill. Examined at Bristol.
2nd Prize £2 2s. Thomas Smith. Examined at Leeds.

Sir Arthur Duckham Memorial Fund.

Official List of Donations from Sept. 15 to Sept. 28.

Name and Town.	Amount. £ s. d.
Town Council of Inverness	9 0 0
Donations (1) paid above	9 0 0
Donations (629) paid previously ...	10,621 18 8
Total Donations (630) paid	£10,630 18 8

Institution of Gas Engineers.

Members of the Institution of Gas Engineers are invited to attend the Opening Meeting of the Illuminating Engineering Society at the Lighting Service Bureau of the Electric Lamp Manufacturers' Association, 2, Savoy Hill, Strand, London, W.C. 2, at 6.30 p.m., on Tuesday, Oct. 9, when Mr. H. Hepworth Thompson will deliver his Presidential Address and a Report on Progress in Illuminating Engineering will be presented by the Technical Committee.

Various exhibits (photometric apparatus, illuminating signs, novel lighting fittings, &c.) illustrating developments in illuminating engineering will be displayed and light refreshments will be provided at 6 p.m.

A Triumph for Stretford.

In September, 1931, the Stretford and District Gas Board suffered the loss of a large industrial load by the removal of the Ford Motor Company, Ltd., to Dagenham. This load was 114,038,200 c.ft. Undismayed, Col. W. M. Carr set about to make up this loss in other directions, and his aim has now been achieved. The following figures show what has been done.

	C.Ft.
Industrial gas load of the Ford Motor Company for 12-month period ended Sept. 30, 1931	114,038,200
Industrial gas load for all other firms for 12-month period ended Sept. 30, 1931	150,109,700
Total industrial gas load	264,147,900
Total industrial gas load for 12-month period ended July 31, 1934	265,316,000

The new load obtained, amounting to 115,206,300 c.ft., includes the following:

	C.Ft.
Asbestos cement works	18,362,600
Cable manufacturers	15,546,200
Gas meter manufacturers	16,796,200
Margarine manufacturers	21,926,800
Central heating (total)	22,998,500
Electrical apparatus manufacturers	4,655,800
Biscuit manufacturers	4,851,700
Steel works	1 742,800
Engineering machinery manufacturers	5,726,000
Total	112,606,600

The balance of 2,599,700 c.ft. represents an increase of all other fluctuating loads. The present approximate distribution of load according to general classes of use in manufacture or production is set below in c.ft. and percentage.

—	C.Ft.	%
Electrical goods	42,000,000	15·7
Foodstuffs	41,000,000	15·5
Metal melting	35,020,000	13·2
Building materials	32,000,000	12·0
Special heat treatment	28,500,000	10·7
Central heating	23,000,000	8·7
General engineering	20,000,000	7·0
Chemical production	18,000,000	6·8
Miscellaneous	18,000,000	6·8
Oils, paints, and varnishes	4,000,000	1·5
Garages	4,000,000	1·5
Total	265,500,000	100·0

Metropolitan Gas Company of Melbourne.

Speaking at the 113th Half-Yearly Meeting of the Metropolitan Gas Company of Melbourne, the Chairman (Sir John Grice) said:

From sales of gas, revenue for the half-year totalled £545,922, and, compared with £570,007 for the period ending June of the previous year, shows a decrease of £24,085. This figure is more than accounted for by a reduction in the price of gas of 3d. per 1,000 c.ft. on all meters read on and after Jan. 12 last.

For the six months under review, the quantity of gas

sold was 1,861,935,400 c.ft. against 1,855,972,000 c.ft. for the June half of 1933—an increase of 5,963,400 c.ft.

For the half-year under review, the net profits were £96,319, and after the amount of £10,000 has been transferred to reserve fund, your Directors now recommend that a dividend at the rate of 6s. 6d. per share (representing a return of 7·97% per annum on the capital subscribed by the shareholders) be authorized for the half-year, leaving an amount of £1,819 to be added to the carry forward, bringing this balance to £67,625.

Increasing business continues to mark the activities of the Appliance Sales Department. Compared with June half-year of 1933, the sales of cooking stoves show an increase of 738, or over 36%.

The number of water heaters sold is greater by 151—over 30% increase. Steadily increasing preference is being shown by the public for complete gas hot-water services, and a substantial number were supplied during the period under review. During the half-year 64 additional units have been installed in hotels and restaurants.

Considerable increases are noted both with regard to mains extensions and new services laid during the half-year under review, as compared with the corresponding period of 1933. 11·82 miles of new mains were laid, compared with 4·24 miles for the June half of 1933. Mains renewals totalled 2·82 miles as against 1·76 miles for the corresponding period of the previous year. The number of new services laid has been 1,869, necessitating the use of 21¾ miles of tubing. The corresponding figures for 1933 were 1,078 services and 13·38 miles of tubing.

The introduction of the new coal-handling plant at West Melbourne Works has effected a substantial reduction in handling costs and freight rates, and this, together with more advantageous prices secured under a new contract for the supply of our coal requirements, has enabled your Directors to revise rates charged for gas by the introduction of a " block " rate.

The new scale, which applies to ordinary meters only, came into operation for meter readings on and after Aug. 12, and is as follows:

	Per Meter per Month.
For the first 1,000 c.ft.	6s. 1d. per 1,000 c.ft.
For the next 4,000 c.ft.	5s. 4d. ,, ,,
For the next 5 000 c.ft.	4s. 8d. ,, ,,
For additional consumption . . . (Over 10 000 c.ft.)	4s. 0d. ,, ,,

The effect of charging on the new scale will be to reduce the total revenue from sales of gas by an estimated amount of £52,500 per annum, or an average of 3·8d. per 1,000 c.ft. sold.

The Chairman then moved the adoption of the report and balance-sheet. The motion was seconded by Mr. Llewellyn Evans and carried unanimously.

Newcastle's New "Domestic Tariff."

A new method of charging for gas supplied to residences for domestic purposes has been introduced by the Newcastle-upon-Tyne and Gateshead Gas Company. The new system is termed the " Domestic Tariff " and is based on the number of " assessable rooms."

For the purposes of the tariff the following are included in the term " assessable rooms ":

Kitchen	Drawing room	Nursery
Breakfast room	Bedrooms	Library
Dining room	Dressing rooms	Study
Lounge	Attics (if furnished)	Smoke room

Other rooms (but excluding sculleries, bathrooms, lavatories).

The new charges, subject to 10% discount for early payment, are as follows:

Number of Assessable Rooms.	First Block of Therms per Quarter at the Published or Flat Rate Gross Price for the Time Being.				Next or Second Block of Therms per Quarter at 1½d. per Therm *Less* than First Block.				Therms in Excess of 1st and 2nd Blocks at—
	Each Quarter Ending March and Dec.		June and Sept.		Each Quarter Ending March and Dec.		June and Sept.		
4 or less	30	..	20		30	..	20		
5	40	..	25		40	..	25		
6	50	..	30		50	..	30		2·2d.
7	60	..	40		60	..	40		
8	70	..	50		70	..	50		per therm
9	80	..	60		80	..	60		
10	90	..	70		90	..	70		*less* than
11	100	..	80		100	..	80		
12	110	..	90		110	..	90		1st Block
13	120	..	100		120	..	100		
14	130	..	110		130	..	110		
15 and over	140	..	120		140	..	120		

The application of the tariff will mean a reduction in cost of gas to thousands of our consumers, and, of course, in no case will it result in an increase in price.

Gas Exhibition at Hornsey

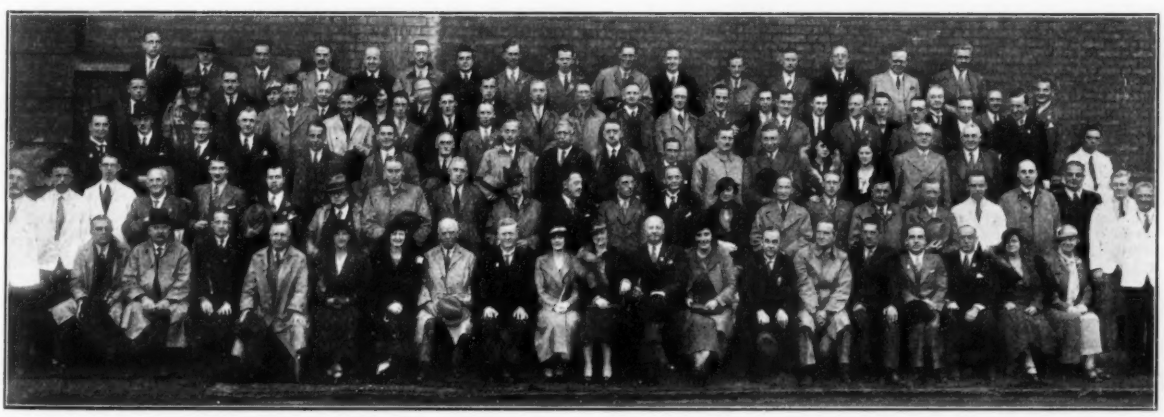
On the platform at the opening of a recent Exhibition of gas appliances and cookery demonstrations at Hornsey—Mr. K. R. Gandon (Engineer of the Hornsey Gas Company), His Worship the Mayor of Hornsey (Councillor W. J. Grimshaw, J.P.), and Mr. K. L. Mortimore (General Manager and Secretary of the Company). In declaring the Exhibition open, the Mayor referred to the fact that there were 24,000 consumers of gas in this Company's area, while the Corporation were themselves large consumers, paying to the Company for public lighting alone some £5,000 annually. The Undertaking, he said, were one of the largest ratepayers in the Borough, and they regularly employed 300 workers with a wage bill of approximately £50,000 a year. It was clear, he concluded, that the fortunes of a large number of people in Hornsey were linked up with the Gas Company. A vote of thanks to the Mayor was proposed by Mr. Mortimore, and following the opening ceremony, cookery demonstrations were given by Miss M. K. Gompertz, M.C.A., who congratulated her audience on living in a district where gas was supplied at such a low rate. Demonstrations, which are attracting large numbers, are being held twice daily this week by Miss D. J. Baker (First-Class Diplomée N.S.T.C.).

Castle Floodlighted by Gas

Thousands of people flocked to see the floodlighting of Bruce Castle, Tottenham, depicted in the above photograph. The installation was carried out by the Tottenham and District Gas Company in connection with the local Borough Charter Celebrations. Enormous crowds, we are told, lined the footway nearest the park, while many more watched from cars drawn up in the road and from the opposite pavement. Many could scarcely believe that the lighting was effected by gas, and very high tributes were paid to the beauty brought out in the Castle by this form of illumination.

Institute of Vitreous Enamellers

First Annual Conference in Birmingham—Visit by Members to the Parkinson Stove Company's Works



The First Annual three-day Conference of the recently constituted Institute of Vitreous Enamellers, an event of close interest to the Gas Industry, was inaugurated by a Banquet at the Grand Hotel, Birmingham, on Friday, Sept. 28. A report of the meeting convened to discuss the formation of the Institute was published in the "JOURNAL" for March 14, 1934, and the objects were set out in the "JOURNAL" for March 28.

The members were received by Dr. J. W. Mellor, F.R.S., President of the Institute. Alderman J. B. Burman, Deputy Lord Mayor of Birmingham, attended, in the unavoidable absence of the Lord Mayor. In addition to the large gathering of members of the Institute, Mr. L. S. Amery, M.P., and Col. J. Baldwin-Webb, M.P., were present, and many prominent leaders of Industry, Commerce, and Scientific Societies closely connected with the Enamelling Industry.

On Saturday morning, following the successful launching of the Conference, more than a hundred members of the Institute assembled at the Grand Hotel and took their place in coaches for a visit to the works of the Parkinson Stove Company at Stechford.

Arrived at the works the party was warmly welcomed by Mr. R. J. Rogers, Managing Director of the Company, on behalf of the Board of Directors. Before proceeding on their tour of inspection, a photograph (reproduced here) was taken of the large gathering.

Proceeding through the various sections of the works, the members watched the progressive stages in the manufacture of domestic gas appliances by modern production methods. The members were much impressed by the self-contained nature of the works, in that the appliances are manufactured throughout in the different departments, from the production of castings in the foundry, to the emerging of the finished appliance ready for despatch.

Naturally, a considerable time was spent in the Enamelling Shops, while members took the opportunity of inspecting the large enamelling plant, and of studying vitreous enamelling in its application to various types of modern gas appliances.

Much interest was shown in the course of the inspection of the extensive Laboratories and Research Departments which, with their modern scientific equipment and highly trained personnel, play such a valuable part in the designing and perfecting of domestic gas appliances.

Leaving the Parkinson Stove Company's works, the party returned to the Grand Hotel for Lunch. In the afternoon a Technical Meeting was held, when Dr. J. W. Mellor, F.R.S., gave the Presidential Address, and a paper, "Vitreous Enamelling," was read by Mr. A. England, M.Sc., followed by a discussion.

BRITISH COMMERCIAL GAS ASSOCIATION

Lieut.-Col. Stephenson was born in 1865, and on leaving Rugby, entered in 1883 the firm of Messrs. Stephenson, Blake & Co., Ltd., of which his father was the head. He became a partner in 1888, and is now Chairman of the Company. He is also Chairman of the Sheffield Gas Company and of Messrs. Thomas Turton & Sons, Ltd., and a Director of other concerns. In 1915, Lieut.-Col. Stephenson went to France in command of the 4th West Riding Howitzer Brigade, and he served in that capacity until 1918. He was mentioned in dispatches three times, and received the Distinguished Service Order. He is an Alderman of the Sheffield City Council, of which he has been a member since 1905, and he has twice filled the office of Lord Mayor. He held the office of Master Cutler in 1919, and represented the Park Division of Sheffield in Parliament from 1918 to 1923. He is a Town Trustee and a Church Burgess, and in 1930 the Freedom of the City of Sheffield was conferred upon him. He is a Magistrate for the City of Sheffield, and also for the West Riding of Yorkshire and for the County of Derby, and filled the office of High Sheriff of Derbyshire for 1932-33. He is a Deputy Lieutenant of York. Lieut.-Col. Stephenson is Pro-Chancellor of the University of Sheffield and Chairman of the Council, and is also an Honorary LL.D.

THE "JOURNAL" REVIEW OF PROCEEDINGS

At the **Twenty-Second**

Annual General Meeting and Conference

Sheffield — Sept. 24 to 26, 1934

President : Lieut.-Colonel H. K. STEPHENSON, D.S.O., D.L., LL.D., J.P.

After Bournemouth—Sheffield. A greater contrast could hardly be imagined than that between the 1933 and the 1934 meeting places of the Association. But, whatever the setting, the B.C.G.A. seems to be given the same hearty welcome year after year wherever it goes, and the northern industrial city appeared just as glad to see us all this year as did the south coast watering place last year, and as will, we firmly believe, the Scottish Capital in 1935. For Councillor W. Muter, Convener of the Edinburgh Corporation Gas Committee, is the new President, and, in inviting the Association to hold its next Conference there he said, "We shall endeavour to order our proceedings to give you as happy and hospitable a time as will make your visit to Edinburgh a very memorable one."

The Reception.

The first assembly of delegates was on the Monday evening at a Reception and Dance in the Town Hall at the invitation of the Lord Mayor and the Sheffield City Council, where, together with their ladies, they were received by Alderman Fred Marshall and the Lady Mayoress, who were supported by the President and Mrs. Stephenson and Mr. and Mrs. Ralph Halkett.

We do not recall exactly where the first reception and dance in connection with B.C.G.A. Conferences took place, but we do look back upon a series of extremely happy functions of this kind, and feel sure we are echoing the sentiments of all members of the Association in assuring the City of Sheffield that this latest, but by no means least, example of municipal hospitality was very highly appreciated.

The season was indicated by huge baskets of richly shaded chrysanthemums, the vestibules were gaily decorated with plants and flowers, and a coloured glow shone everywhere from innumerable japanese lanterns. In the magnificent ballroom the music was a credit to the Police Dance Band which supplied it, and altogether a thoroughly enjoyable evening prepared the delegates for the sterner business of the morrow.

A Civic Welcome.

In addition to its Town Hall, Sheffield possesses a City Hall, in which, in turn, is contained a Memorial Hall—a tribute to the memory of those who fell in the war. This—a large lecture hall on amphitheatre lines—was placed at the disposal of the meeting, and it comfortably and conveniently accommodated the business sittings. Here on Tuesday morning, after passing a display—almost bewildering in its variety—of the literary and artistic productions of the Association, the delegates assembled for the first business session.

Colonel Stephenson, before embarking on the formalities of the day, invited the meeting to rise for a moment as an expression of sympathy with a kindred industry in the disaster which had befallen it so recently at Gresford Colliery. It was agreed that a message conveying the condolences of so representative a gathering of the Gas Industry be sent to the proper quarter.

The Lord Mayor then extended to the Conference a civic welcome, which he prefaced by his assurance that the citizens of Sheffield would wish to be associated with the vote of condolence passed by the meeting. Having referred to the Gas Industry as not only a great and powerful one, but as a national industry in the really true sense, Alderman Marshall paid tribute to the exceptionally good supply of gas which Sheffield had always enjoyed. He referred to the services rendered to the City in many ways by Colonel Stephenson, and concluded by expressing his pleasure, in which everybody would share, that the City's difficulties had diminished to some extent in the past year with improvement in local industry.

The President, in returning thanks for the Lord Mayor's welcome, felt sure the delegates would wish him at the same time to express their gratitude for the wonderful

entertainment of the previous evening—a suggestion which was greeted with applause that left no doubt. He referred to the service gas is rendering to industry—not least to the industries of Sheffield, which are using gas in increasing quantities for furnaces. Gas was also rendering a service to the health of the community, he said, by getting rid of that smoke which had always been the curse of Sheffield. The city, due largely to its use, was far less smoky than it was some years ago, and the tendency was still to improve.

Annual Report and Accounts.

Mr. C. H. Chester (Swindon) and Mr. E. Crowther (Salford) having been unanimously elected as Scrutineers of the ballot papers for the election of President and Auditors for the ensuing year, Sir Francis Goodenough rose to introduce the Annual Report (which was given in full in our issue last week) and the Accounts. Sir Francis announced the receipt of a letter of greetings from Major Alexander Forward, Managing Director of the American Gas Association, and of a cable from Mr. A. W. Smith, who is visiting America with Dr. C. M. Walter. Mr. Arthur Hewitt, of the Toronto Gas Company, had also sent best wishes for a successful Conference. Sir Francis was sure they would all miss Mr. Smith at the present meeting, and would wish him every success with his investigations. Sir Francis also mentioned that on behalf of the Association he had addressed a congratulatory message to Prince George on the occasion of his betrothal. He then referred with sympathy to the death of their old friend, Mr. J. W. Auchterlonie, who had been an original member of the Executive of the Association, as was Mr. Robert Watson, who, as they knew, was retiring from active service at the end of this month. After this he, Sir Francis, and Mr. W. N. Westlake, of Exeter, would be the only remaining original members of the Executive formed 22 years ago.

Sir Francis mentioned with satisfaction that the appeal recently made for increased support of the national bodies had met with encouraging response, and he hoped that the 70% of the Industry which had already agreed would before long be considerably increased. In spite of the efforts of the Association they must not believe that it would be purely by a national policy that the Industry would win through, but rather by the individual efforts of every undertaking backed by the national effort of the central organizations.

The adoption of the Report and Accounts was seconded by Alderman John E. Daw, of Exeter, who explained in detail the proposed alterations of the rules which had been set out in the Report. Alderman Daw, the President announced, had been of the greatest assistance to the Association in drafting the new rules. Along with the Report and Accounts, they were unanimously approved.

The New President.

The President then announced the result of the ballot, as reported by the Scrutineers, electing as President for the ensuing year Councillor W. Muter, Convener of the Edinburgh Corporation Gas Committee. Messrs. Cash, Stone, & Co., he said, had been unanimously elected Auditors.

Councillor Muter, having graciously acknowledged his election, invited the Association to hold its next Annual Conference in Edinburgh, where, even if they could not guarantee the wonderful weather they were enjoying in Sheffield that day, they could assure the Association of a very hearty welcome. Needless to say, the invitation was gratefully (and popularly) accepted.

Before proceeding to the next business, the President offered a hearty welcome to two overseas visitors—M. L. Carpentier, President of the Union Syndicale de l'Industrie du Gaz en France, and M. Gaumont, also from France.

Presidential Address.

The President then delivered his Address—an admirable review of current events as they affect the Gas Industry. The full text is reproduced in other columns of this issue, and we need here emphasize only two points which the President stressed in his concluding remarks. First, we are face to face with a new and very aggressive competitor in the form of the electricity grid—a competitor with apparently unlimited funds for propaganda work. It was in order to enable this Association to meet this propaganda by adequate counter-propaganda that he had given his signature to the letter also signed by the Presidents of the National Gas Council and of the Institution of Gas Engineers, notifying the increase to 10s. per million c.ft. of gas made in the rate of the joint contribution payable to the National Associations. The splendid response to this appeal would go a long way towards the provision of counter-propaganda; but in order that it should be completely effective it demanded that the full 100% of members should contribute in equal proportion.

Secondly, excellently as this Association did its work, it could not do everything, and, if the Gas Industry was to hold its own, individual effort on lines he had tried to indicate was essential. But time and tide wait for no man, and those undertakings which, for one reason or another, could not adopt a progressive policy should seek the shelter of those which can and will. He looked upon the existence of small and isolated undertakings as the weakest spot in our Industry.

We Must Move with the Times.

A vote of thanks to Colonel Stephenson for his Address was moved by Sir David Milne-Watson. He referred to the fact that Sheffield is an extremely interesting gas centre, and that the Company which serves it has certain unique features which deserve very careful consideration, especially by those who live within range of coke ovens or other gas supplies of the kind. The Company was fortunate in having so able a Chairman and such an energetic man as Mr. Halkett as Manager.

Colonel Stephenson's Address, he said, had brought well into evidence many of the facts and features of the Gas Industry as we find it in 1934. Sir Francis Goodenough, whom they were all so pleased to see back again, had been quite right in emphasizing that the future success of the

NEW PRESIDENT OF THE B.C.G.A.

Councillor Walter Muter was born in 1888 in the county of Dumbartonshire. He was educated in Helensburgh and Glasgow, and as a young man transferred to Edinburgh. For many years he has taken a keen interest in public affairs, being specially identified with educational problems. He is a recognized authority on superannuation matters, and was closely associated with the late Rt. Hon. William Graham in much of his Parliamentary work on that and other questions. He is a foundation member of the Edinburgh Parliament, and has held all the important offices in that Institution, which has produced many well-known Parliamentarians. Since his entry to the Edinburgh Town Council, Councillor Muter has taken a leading part in the work of the Education and Public Utilities Committees, and was appointed Convener of the Gas Committee in 1933. During the intervening period he has displayed considerable energy and enthusiasm in the work of the Department, and is a firm believer in the expansion of the Industry. Councillor Muter is an official of the London and North-Eastern Railway Company, and during the war served with the Royal Engineers in France and Italy.

Gas Industry depended both upon adequate support of the national bodies and upon individual effort.

With regard to the future, Sir David said he was optimistic. They had never been a showy, flashy industry, but had proceeded steadily for more than a century, and the Industry to-day was in an extremely healthy position. They must, however, move with the times, and after their methods as the times altered. Amalgamations, for instance, were taking place, and holding companies were entering into the field. Critics in the Press were shouting "Remember the poor consumer." Sir David was of opinion that the poor consumer *was* being remembered in

these amalgamations, and it was absolutely essential that he should be given good service. The Sheffield Gas Company had taken over small undertakings which, for example, had no showrooms, and had been able to give them showrooms. This was only one way in which the bigger undertakings could help the smaller. "Are the holding companies good for the consumer?" asked Sir David. At all events he could say that a holding Company of which he had the honour to be Chairman had been able to reduce the price of gas in four cases although it had been formed only a year, so that that Company at all events was alive to the advantages and the duty of reducing prices as soon as possible.

As regards support of the national bodies, Sir David announced that the principle of the increased contributions having been endorsed by so large a proportion of the Industry as 70%, steps would have to be taken as soon as possible to ensure that no one should have the benefit of the advice and support of the national bodies unless he contributed on the basis which had been decided.

The vote of thanks was seconded by Mr. D. W. Turner, Chairman of the Society of British Gas Industries. "Personally I am convinced," said Mr. Turner, "that if the Gas Industry is given a square deal with its competitors, with free and healthy competition, and with such men as Colonel Stephenson in it, and with persistency of effort both collectively and individually, we can look forward to the future with very great optimism."

International Exchange of Advertising Matter.

The next item on the programme was the introduction by Mr. C. Valon Bennett, President of the Institution of Gas Engineers, of the Report which had been submitted to the International Gas Conference at Zurich by the Institution. In view of the fact that this had been reported in full [see "JOURNAL," Sept. 5] and that complete copies were available at the meeting, Mr. Bennett proposed to take the Report as read. He wished to refer, however, in particular to the suggestion in the report that consideration should be given to the establishment of an international exchange through which each country would periodically circulate copies of its advertising matter to the national organizations or leading gas undertakings of other countries. By this means a common fund of advertising ideas, constantly replenished, would become available to all gas advertisers. This suggestion, said Mr. Bennett, had been welcomed by the delegates present from many nations, who had expressed themselves strongly in favour of international collaboration in this way. A special sub-committee, he announced, would shortly be formed to discuss measures which might be taken in this direction.

Another impressive matter, he said, had been made plain at the Zurich Conference, and that was the high value placed in some countries on propaganda magazines and goodwill literature. In Germany, for instance, many undertakings issued regular news sheets which were usually sent out with the monthly accounts, and in France a monthly illustrated magazine was issued by the Gas Association which had no fewer than 200,000 subscribers in all parts of the country. "In our experience," said Mr. Bennett, "most of us have found that our competitors are alive to the inherent advantages of a method of advertising which provides a good deal of jam for the advertisement pill. In this country, however, we have no gas magazine or news sheet which regularly reaches anything like 200,000 consumers. I can see no reason why it should not be done if we make up our minds to increase our support of the literature issued by the British Commercial Gas Association."

Papers and Discussions.

The morning session was completed with the presentation of two papers—"Co-operation of all Arms," by Mr. W. D. Rowe, Manager of the Association, and "Home Service," by Mrs. Eileen Murphy, who, as has recently been announced, is engaged in organizing a Home Service Section for the Association. There was no discussion on these papers, and they are reproduced in full on later pages of this issue. After an adjournment for lunch, business was resumed with the presentation of a paper by Mr. Ralph Halkett, General Manager and Secretary of the Sheffield Gas Company. This is also given in full on later pages, together with contributions to an interesting discussion upon it by Dr. E. W. Smith, Mr. H. E. Bloor, Mr. William Cash, Sir David Milne-Watson, and Mr. R. H. Hems, in which the topic of holding companies was again to the fore.

Two Interesting Visits.

Following Mr. Halkett's paper, two alternative visits were available. One party inspected the Research and Industrial Departments of the Sheffield Gas Company, and another the Control Room at the Company's Head Office.

The Research Department, housed at the Effingham Street Works, comprises a research furnace room, a research laboratory, a photographic dark room, and a micrographic and balance room. These are equipped with the most modern precision instruments for the scientific testing and examination of steels and metals, which are used not only for research purposes, but also for testing work treated in demonstrations to local manufacturers, and for carrying out physical tests on manufacturers' own products, free of charge. In addition, a furnace demonstration room is available, in which standard types of gas-fired furnaces produced by furnace builders are shown under working conditions. The latter room is essentially under the control of the Industrial Department, but furnaces embodying the results of work done in the Research Department and built by the Company's own Staff also form part of the equipment.

As regards the Control Room, in order to keep in constant and immediate touch with the several coke ovens from which the Company draw their supplies of gas, there has been installed at the Head Office apparatus which will show at all times the index of the meter measuring the gas supplied at any coke oven, and its calorific value. Telephonic communication is also established between the Control Room and the power house at each of the ovens.

The Annual Dinner.

In addition to the beautiful Town Hall where the Reception had been held and the City Hall where the business meetings took place, Sheffield is proud of its Cutlers' Hall, and it was here on the Tuesday evening that nearly five hundred guests assembled to be entertained at Dinner by the Chairman and Directors of the Sheffield Gas Company. Colonel H. K. Stephenson presided in his capacity as Chairman of the Company. Included among the guests were the Lord Mayor, the Master Cutler, Mr. Charles J. Walsh, and many others who are concerned with the industrial and civic life of Sheffield and the district. Considerable regret was expressed at the unavoidable absence of Sir Robert Hadfield, Bart., who is a Director of the Gas Company and was President of the Association when it last held its Conference in Sheffield in 1920. Through the Chairman, however, he made the offer of a prize of ten guineas for a paper on the value of the use of gas for industrial purposes—an offer which was, of course, gratefully accepted. During dinner excellent music was provided by the Sheffield City Police Orchestra under the direction of Mr. George W. Hespe, L.R.A.M., A.R.C.M. Songs were charmingly rendered by Miss Ida Bloor.

The loyal toasts having been duly honoured, Mr. C. Valon Bennett, President of the Institution of Gas Engineers, proposed "The City and Trade of Sheffield," in a speech which was in every way worthy of the occasion, and in which he paid full tribute to the wonderful industrial record of the City in the past, and the remarkable revival in its trades which had begun in the last year. As only one example, exports of tools and implements have shown a continual and steady increase from the low point until the volume to-day is nearly equal to that of 1929 which was a peak year. In a speech which contained an admirable mixture of the serious and the amusing, the Lord Mayor responded to the toast, and his response was followed by that of the Master Cutler, who is recognized in Sheffield as the second citizen.

The toast of "The Gas Industry" was proposed by Sir Samuel Roberts, Bart., M.A., LL.B., M.P., J.P. In the course of his speech he said: "I have no doubt that the Gas Industry is not yet satisfied with all that Parliament has done; I have never known any industry satisfied with what Parliament has done. But I think I can assure you that at any rate the present House of Commons means to see that gas gets a square deal and that it is sympathetic with the efforts of the Industry in this country." A remark which was, of course, received with general applause. Sir Samuel Roberts coupled with the toast the name of Sir David Milne-Watson, who in his reply emphasized that such increases of business as the Sheffield 14%, of which they had heard that day, were not bought cheaply, but were the result of a very large amount of hard work and sacrifice. Referring to the recent Act, Sir David emphasized that, while the Industry was thankful for what it had obtained, it had by no means obtained all it wanted, and they were all hoping that the House of Commons and the Government would see fit to supply the deficiency in the future.

The toast of "The Guests" was proposed by the President, who included among the names specially mentioned that of Mr. James F. Ronca, O.B.E., Director of Gas Administration at the Board of Trade, who replied in a brief and very charming speech which left all the guests

perfectly satisfied that the reply on their behalf had been left in his hands.

Labour—Education.

Business opened on the Wednesday morning with an Address by the Rt. Hon. J. R. Clynes, P.C., J.P., entitled "Labour and the Gas Industry," which is reproduced on later pages.

At its conclusion, a vote of thanks to Mr. Clynes was moved by Mr. William Cash. As Chairman of a Regional Council he was able, he said, to bear witness to the spirit which animated the discussions they had there with representatives of the workpeople, and he was confident that these discussions could produce nothing but satisfactory results provided the right attitude was adopted throughout by both sides—in other words, so long as the men were assured that they could look for a square deal when they had stated the facts they wished to bring forward. Mr. Cash went on to refer to the highly developed working of systems of profit sharing and co-partnership in the Gas Industry, and quoted figures as an instance of what is being done apart from the mere payment of wages.

Mr. H. D. Madden, of Cardiff, seconded, and Sir Francis Goodenough supported the vote of thanks, which was carried with acclamation.

Mr. John Terrace then presented his Paper on "Education in the Gas Industry," to which, as will be seen from our full report, an interesting discussion added the views of several other speakers.

Votes of Thanks.

The business sessions were closed with votes of thanks. Mr. H. Stanley Taylor, Chairman of the Bath Gas Company, first of all moved one to the Executive Committee and the Staff of the Association, mentioning in particular the names of Sir Francis Goodenough, Mr. W. D. Rowe, Mr. J. C. Walker, and Mrs. Eileen Murphy. He expressed the opinion that the work which is being done is thoroughly good, and is leading the Industry to a far greater extent than many really believe. The vote was seconded by Councillor R. H. Hume, Chairman of the Birmingham Gas Department, who particularly congratulated the Association on having carried without criticism the necessary alterations to the rules. It was good to know, he said, that criticism of the Executive came from within. He expressed the sincere wishes of everybody in the hope that Sir Francis Goodenough has left his bad health in the background and will now go on from strength to strength.

Sir Francis Goodenough, to the general amusement, stated that he had the greatest confidence in replying because he had been doing no work for the last six months. None the less he heartily thanked the proposer and seconder, and said how pleased he was to take this opportunity of thanking the Staff for the way in which they had carried on in his absence. Sir Francis then called upon Mr. W. D. Rowe, who remarked how greatly they had been handicapped by Sir Francis's unfortunate absence. Now that he was back they would again be working under his inspiration. Mr. Rowe also paid a tribute to the tremendous help he had received from Mr. Walker. He referred to the re-organization of the Staff which had been, and was still being, carried out with the help of the Establishment Committee. The underlying change was that they were going to have among the senior officers experts in each particular department, who would be available to visit the various undertakings and give any assistance they possibly could. He would like to remind them that it was the *British* Commercial Gas Association, and although the offices were in London, their thoughts were much more often with the provincial members. At least 75% of the work was done for the smaller undertakings.

A vote of thanks to the President was proposed by Mr. J. E. Cowen, J.P., Chairman of the Newcastle-on-Tyne and Gateshead Gas Company, both for his great service to the Association during his year of office, and for the way in which he had presided during the present Congress over both their business and social activities.

The vote was naturally carried with acclamation, and after a response by Colonel Stephenson, the meeting closed.

Luncheon to the President and Sheffield Directors.

The last official function in connection with the Conference was held at the Royal Victoria Hotel, Sheffield, on Wednesday, when the President-Elect, the Vice-Presidents, and members of the Association entertained at luncheon the retiring President and his co-Directors of the Gas Company.

Councillor Walter Muter, President-Elect, was in the Chair, and he proposed the health of the retiring President and the Directors of the Sheffield Gas Company, to which Colonel Stephenson replied. The toast of "The Press" was given by Sir Francis Goodenough, who said that they had had good cause to learn during the last few days that Sheffield is extraordinarily well served so far as the Press is concerned. Mr. John Oakley, J.P., Editor of the *Sheffield Telegraph*, replied with a humorous speech, and finally Sir Russell Bencraft, Chairman of the Southampton Gas Light and Coke Company, proposed the health of Mr. Halkett and his staff, and thanked them for the splendid arrangements they had made for the Conference. Mr. Halkett, he said, had arranged the proceedings with the same ability as he applied to his duties as General Manager of the Gas Company, and that was the highest praise he, Sir Russell, could award him. In returning thanks Mr. Halkett said it gave him great pleasure to tell them that the whole of the organizing of the Conference had fallen upon the shoulders of his son, Mr. Ralph Halkett, Junior, to whom Sir Russell had specially referred in his speech. But, well though he had carried out these duties, he could not have attained the same measure of success without the backing of a loyal and energetic Staff. It was to him and the Staff that thanks were due. If the Conference had been a success, their labours had been well repaid, and they would appreciate very highly the thanks expressed in the toast.

Referring to the instrument which they had seen in the Control Room on the previous day, Mr. Halkett said that it was the only one working in this country, and he wished to take this opportunity of complimenting his Engineer, Mr. H. Chamberlain, who had had a great deal to do with introducing it in association with the Standard Telephone Company. For any other grids which might be formed, or even for normal gas-works practice, an instrument such as this could be brought into operation. Finally, he wished to thank Sir Francis Goodenough, Mr. Rowe, Mr. Walker, and their Staffs for the great help which they had given to Sheffield in connection with the Conference. Whatever had been asked for had been willingly given, and the task of the local organizers had thereby been considerably lightened.

The Evolution of the Sinusoidal Diagram and Horizontal Illumination Charts*

By Wm. J. G. Davey, B.Sc. (Research Illuminating Engineer, Messrs. W. Parkinson & Co.)

The extended use of directional reflectors has caused a minor revolution in photometric methods and street lighting calculations.

With a symmetric fitting, the distribution of candle-power, determined by the somewhat leisurely, not to say tedious, use of the bar photometer, could be shown on a single polar curve. The mean hemispherical candle-power and total lumen output were closely related to this polar curve, and easily calculable. The determination of test-point illumination was simple, as the candle power was uniform through any horizontal plane. The average illumination on a street could be easily calculated by such formulæ as that of Stiles. Moreover, the preparation of iso-lux diagrams to represent the distribution of illumination over a street was straightforward, as each iso-lux line from a particular unit comprised a circle with the light source as centre.

The use of directive fittings, however, has complicated matters. A multiplicity of polar curves is necessary to show the distribution of candle-power.

Integrating spheres and cubes are required, to determine lumen output without involved calculation. The determination of test-point illumination requires a consideration of candle-powers at different azimuthal angles. The calculation of average illumination is extremely difficult without some form of equi-areal projection, while the representation of the distribution of horizontal illumination by means of iso-lux diagrams becomes, using the standard methods, a very long and tedious process.

The sinusoidal diagram, which had already been extensively used by geographers and astronomers, was called into service as a convenient method of representing the distribution of candle-power, and is applicable also to the calculation of average illumination. It has been fully described from the mathematical and non-mathematical points of view during the past few years, and may be regarded as a contour map, incorporating the multiplicity of polar curves which represent the distribution of candle power from a directive light source, on a single chart.

The model, fig. 1, may serve to illustrate the relationship of the sinusoidal diagram to the polar curves whence it is derived. M.1 is a solid model, showing the wave front of candle power distribution of a 4-light alignment burner (No. 2 mantles), in an 18-in. square lantern, and fitted with Mor-lite directional reflectors below the burner. The reflectors are adjusted to throw their maximum beam at right-angles to the line of mantles—*i.e.*, at the same azimuthal angle as the maximum beam from the alignment burner, and at an angle of 15° below the horizontal. Candle-powers from 0-100, 100-200, &c., are differently shaded. A vertical radial section of the model at any azimuthal angle gives the polar curve at that angle. Thus, D.1 shows the polar curve of the fitting at 0° azimuth, and is the section which would be produced if the model M.1 were cut at that angle.

D.2 shows the candle-powers at 0° azimuth plotted on ordinary graph paper instead of polar paper. If such curves for the series of azimuthal angles are spaced at distances representing the azimuthal angles to which they refer, the wave front which they enclose is shown in M.2.

A contour map of this model is shown in D.3. The lower edge of the model M.2 and diagram D.3 represents a position at 90° from the horizontal—*i.e.*, immediately beneath the lamp. All the points along this line are, therefore, coincident, and are made so in diagram D.4, which comprises the lower half of the sinusoidal diagram of this fitting.

Use of the Photo-Electric Cell.

The determination of candle-powers for the preparation of the sinusoidal diagram is, with any form of subjective photometer, a lengthy and tedious process, causing considerable eye-strain. The thirty to forty readings necessary for the determination of a polar curve must be multiplied to about four hundred in the case of a sinusoidal diagram. Fortunately, there are objective photometers, in the form of photo-electric cells, which speed up the candle-power determinations, and involve no eye-strain other than that occasioned in reading a galvanometer scale. If the photo-cell is calibrated before and during a test, using the subjective photometer, the results may be obtained with a satisfactory degree of accuracy. In the Parkinson laboratories the photo-cell is fitted to a hoop,

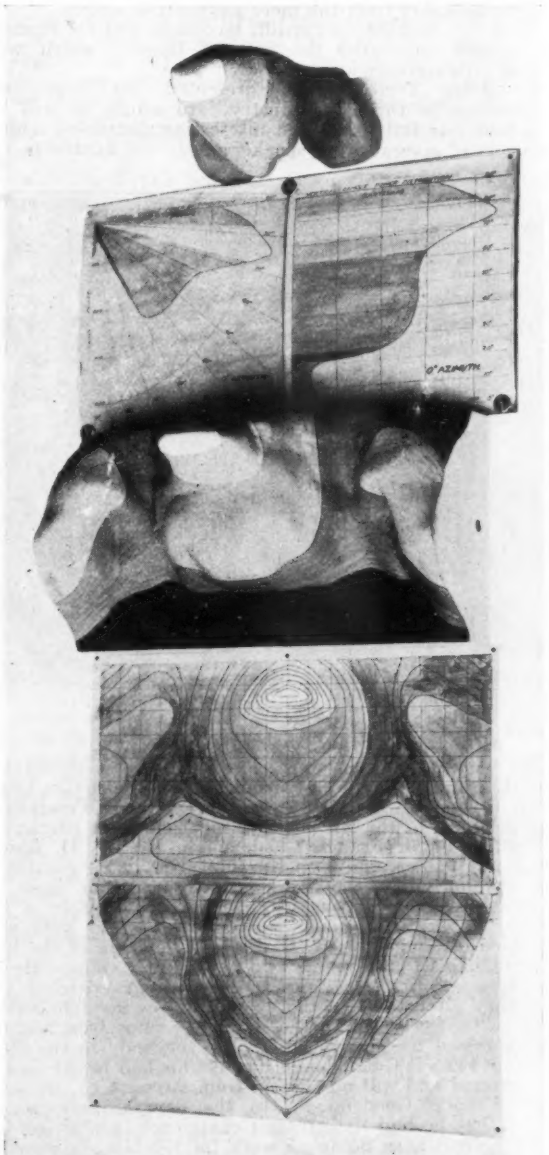


Fig. 1.—The Evolution of the Sinusoidal Diagram.

revolving round the lamp, so that the sensitive surface is always normal to the light source.

The advantages of this form of photometer will be further appreciated when it is realized that if adjustable reflectors are fitted to an already directive fitting, a different sinusoidal diagram will have to be prepared for each adjustment of the reflectors, and, consequently, for each new street-lighting scheme, until sufficient data have

* Paper at the Eleventh Annual Meeting and Conference of the Association of Public Lighting Engineers held in Aberdeen during Sept. 17 to 20, 1934.

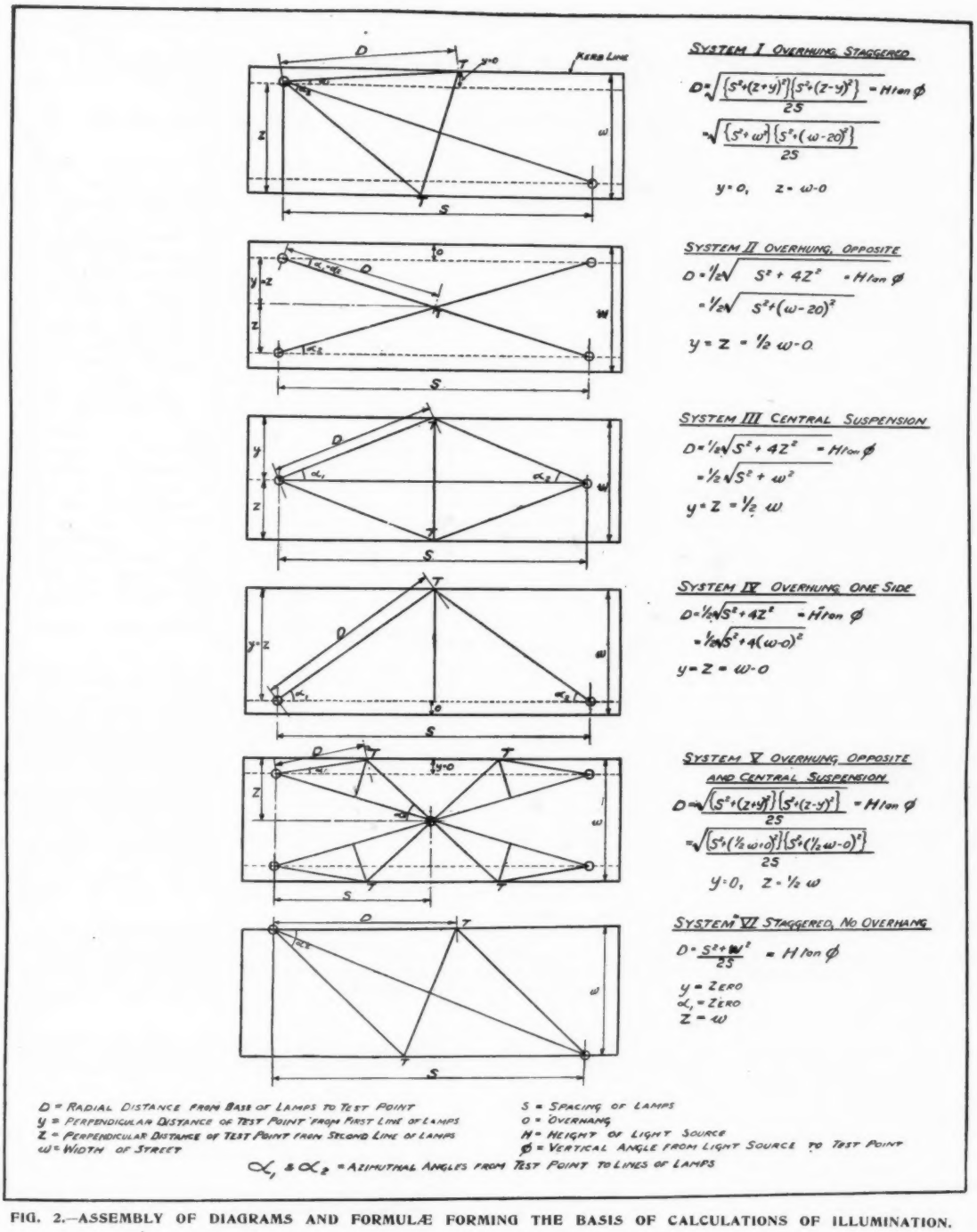

SYSTEM I OVERHUNG, STAGGERED
SYSTEM II OVERHUNG, OPPOSITE
SYSTEM III CENTRAL SUSPENSION
SYSTEM IV OVERHUNG ONE SIDE
SYSTEM V OVERHUNG, OPPOSITE AND CENTRAL SUSPENSION
SYSTEM VI STAGGERED, NO OVERHANG
KERB LINE
D = RADIAL DISTANCE FROM BASE OF LAMPS TO TEST POINT
y = PERPENDICULAR DISTANCE OF TEST POINT FROM FIRST LINE OF LAMPS
Z = PERPENDICULAR DISTANCE OF TEST POINT FROM SECOND LINE OF LAMPS
W = WIDTH OF STREET
S = SPACING OF LAMPS
O = OVERHANG
H = HEIGHT OF LIGHT SOURCE
φ = VERTICAL ANGLE FROM LIGHT SOURCE TO TEST POINT
α1 & α2 = AZIMUTHAL ANGLES FROM TEST POINT TO LINES OF LAMPS

FIG. 2.—ASSEMBLY OF DIAGRAMS AND FORMULÆ FORMING THE BASIS OF CALCULATIONS OF ILLUMINATION.

been obtained to assess the respective influences of directive fitting and adjustable reflector upon the candle-power distribution.

Test-Point Illumination.

A method has been developed in the Parkinson Laboratories which enables test-point illumination to be calculated without the necessity of drawing a plan of the installation. Given the system of illumination, the spacing, the overhang, the width of the street, and the height of the lamp, all the necessary data is available for calculating the vertical and azimuthal angles subtended from the lamp to the test-points. Thus the radial distance from the lamp to the test-point may be determined from the general formula:

$$D = \sqrt{\frac{(s^2 + o^2)\left\{s^2 + (w - 2O^2)\right\}}{2s}} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

where s = the spacing,
w = the width of the road,
o = the overhang, and
D = the radial distance from the base of the lamp to the test point.

Formulæ derived from the above may be obtained for all the usual systems of lighting, as shown in fig. 2.

The perpendicular distances W, from the plane of the lamp parallel to the street, to the test-points, are, also given as y and z, in fig. 2.

The vertical angle ϕ is calculated from the formula $D = H \tan \phi$, where H = the height of the lamp,

$$\text{or } \phi = \tan^{-1} D/H \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

and the azimuthal angles α_1, and α_2, from the formula

$$W = D \sin \alpha,$$

$$\text{or } \alpha = \sin^{-1} W/D \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

The candle-power for the vertical angle ϕ, and the azimuthal angles α_1 and α_2, are read off from the sinusoidal diagram, and the sum of these candle-powers is multiplied by $\cos^3 \phi / H^2$, to obtain the test-point illumination, E_t.

$$E_t = \left\{ I\phi\,(\alpha_1) + I\phi\,(\alpha_2) \right\} \cos^3 \phi / H^2 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (4)$$

Formulæ (2), (3), and (4) may be solved by means of the nomographic chart, fig. 3.

An actual example will best illustrate the use of the Parkinson Charts. Suppose that we have a staggered

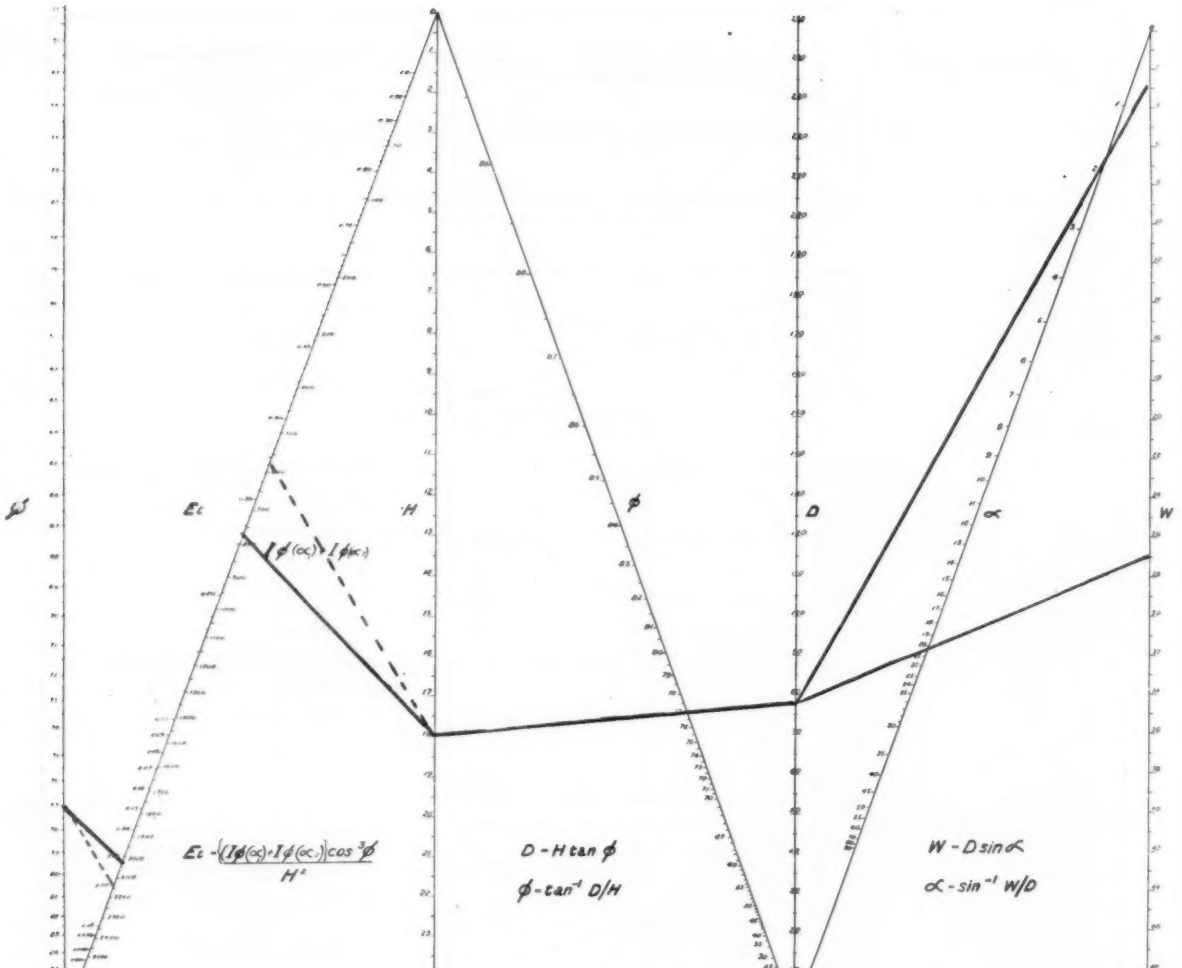


FIG. 3.—CHARTS ENABLING (*a*) REQUISITE CANDLE-POWER TO ENSURE A CERTAIN TEST-POINT ILLUMINATION AND (*b*) THE TEST-POINT ILLUMINATION CORRESPONDING TO SPECIFIED CANDLE-POWERS AND ANGLES OF INCLINATION TO BE DETERMINED.

system with lamps overhung 3 ft. into the road. The width of the road is 30 ft., and the spacing 150 ft. The mounting height of the lamps is 18 ft.

Referring to fig. 2, we have for system I Overhung, staggered,

$$D = H \tan \phi = \sqrt{\frac{(s^2 + w^2)\left\{s^2 + (w - 2o)^2\right\}}{2s}}$$

where s = spacing = 150 ft.,
w = road width = 30 ft,
o = overhang = 3 ft.,
and H = height of lamp = 18 ft.

This formula becomes

$$D = H \tan \phi = \frac{\sqrt{(22{,}500 + 900)\,(22{,}500 + 576)}}{300}$$

$$= 77{\cdot}45.$$

It is next necessary to determine the azimuthal angles α_1 and α_2, and the vertical angle ϕ. The azimuthal angles are calculable from the formulæ.

$$\alpha_1 = \sin^{-1} W_1/D$$
and $\alpha_2 = \sin^{-1} W_2/D$
where $D = H \tan \phi = 77{\cdot}45$.
$W_1 = y = o = 3$,
and $W_2 = z = w - o = 27$.

They may be obtained by the use of the right-hand chart, fig. 3. Thus, to determine α_1, a line is drawn from the point 77·45 on Scale D to the point 3 on Scale W. This intersects the oblique Scale α at 2°, $= \alpha_1$. To determine α_2, a line is drawn from the point 77·45 on Scale D, to the point 27 on Scale W. This intersects the oblique Scale α at $20\frac{1}{2}°$ $= \alpha_2$.

The centre Chart is used for determining the vertical angle ϕ, which is calculable from the formula

$$\phi = \tan^{-1} D/H$$
where D = 77·45
and H = 18.

A line is drawn from the point 77·45 on Scale D to the point 18 on Scale H. This intersects the oblique Scale ϕ at the point 77° $= \phi$

The left-hand chart may be used for two purposes: (1) to determine the aggregate candle-power necessary at $\phi°$ to obtain a given test-point illumination; (2) to determine the test-point illumination obtainable from a fitting when the candle-powers at the vertical angle ϕ, and the azimuthal angles α_1 and α_2 (read off from the sinusoidal diagram of a given fitting) are known.

(1) The dotted lines on the left-hand chart show how the aggregate candle-power necessary to give a test-point illumination of 0·02 foot-candles is determined. The actual formula will be

$$\Sigma I\phi = \frac{E_t\, H^2}{\cos^3 \phi} \qquad \ldots\ldots\ldots\

Presidential Address to the B.C.G.A.

By Lieut.-Colonel H. K. STEPHENSON, D.S.O., D.L., LL.D., J.P.

I should like to express on behalf of the Board of the Sheffield Gas Company our pleasure that the members of the British Commercial Gas Association have been able to accept our invitation to hold their Annual Conference in Sheffield and our hope that the visit to this great industrial centre will be a pleasant one.

I remember, when accepting office as your President at Bournemouth a year ago, saying that I should have hesitated to do so had not Sir Francis offered to act as my guide, philosopher, and friend during my term. If I have not received so much assistance from him as I had hoped, that has been due to no fault of his, and much as I regret his inability to attend a number of our meetings, it has given me the opportunity of availing myself of the good offices of Mr. Rowe and Mr. Walker, whose assistance has been invaluable.

In my capacity as retiring President, let me assure you in the first place how much I have been impressed by the value of the work which is being done by the British Commercial Gas Association. I am ashamed to say that unlike most of your Past-Presidents, I had, owing to many other engagements, not had the advantage of personal contact with its officers or committees before taking office, and the year has therefore been to me something in the nature of a course of primary education.

The National Importance of the Gas Industry.

On an occasion like the present, it is appropriate to emphasize the national importance of the great Industry which we all serve and to call attention to the invaluable assistance rendered to this Industry by the activities of the British Commercial Gas Association.

To-day, gas no longer has any monopoly as a lighting or heating agent, and our competitors quite properly use every endeavour to put before the public the claims of other agencies such as electricity, oil, and raw coal. It is therefore necessary that we should be able to prove that for such things as lighting, heating, cooking, hot water supply, &c., gas is by no means a back number, but that as a result of research and continual improvements, it is making greater progress than at any previous period in its history.

The secret of its success may be summed up in the one word " Reliability." Unlike some of its competitors, it is not only easy to control but it never varies and does not break down, and may be depended upon for whatever purpose it is required, not only by day but also in the hours of darkness.

We may claim too that not only is the service which gas renders the most perfect as regards consistency and reliability, but also that it is the most economical.

Publicity and the B.C.G.A.

On this account, while it is unnecessary to exaggerate the claims of gas, it is of the utmost importance that those claims should be brought prominently before the public and pressed home, and this is where the British Commercial Gas Association can and does render the greatest possible assistance to the Industry. Its headquarters in London are a centre of activity from which flow not only advertising matter but all sorts of schemes for the purpose of instructing the public in the advantages and uses of gas as well as for educating those within the Industry itself.

The cleverness and brightness of the advertisements emanating from the brains of our headquarters have done much to popularize the use of gas in the home, and the benefit of those advertisements is of no less advantage to the gas undertakings in the provinces than to those in London—because the great daily newspapers are read by all.

As you will realize, our Association maintains very close contact with the Press, and as a result I am sure I may say that the relationship between the Press and the Gas Industry is more cordial than ever before. The newspapers to-day are more alive than formerly to the virtues of gas as is evidenced by the appreciative terms in which its merits are now discussed, not only in the London Press but also in local newspapers.

But the British Commercial Gas Association does much more than merely turn out attractive newspaper advertisements. It is ever ready to assist its members with the best possible advice on the problems which beset them. These are many and various owing to diverse local conditions. There is a world of difference between the problems which present themselves for solution in the Industrial North and those to be faced in the South of England.

Our position in Sheffield with an enormous and increasing industrial load, and with some 75% of the population directly or indirectly interested in the steel and cutlery trades, cannot be compared with that of a gas undertaking in a residential town in the South of England. There is, however, this similarity—we both derive benefit from the activities of the British Commercial Gas Association which provides lectures, window and showroom displays, and a constant stream of up-to-date literature dealing with the many uses of gas.

Now all this work cannot be carried on without ample funds, and it is not too much to say that the wellbeing of every gas undertaking is concerned with the provision of those funds.

Personally I have always believed in the principle " Live and let live." I am not so foolish as to deny the use and convenience of electricity in its proper sphere, but unfortunately that is not always the spirit which animates our competitors, who too often refuse to admit that there is any place for gas under modern conditions.

Electricity Breakdowns.

Both the gas and electriciy supply industries are operated under statutory authority.

Both industries are employed by local authorities for public lighting, but whereas gas costs less in that it gives more light for less money and never fails, electricity provides a most unreliable service, and one can scarcely open a newspaper without seeing the report of a breakdown in some part of the country or another. How many breakdowns go unrecorded may well be left to your imagination.

We all remember how the scientists assembled at York were plunged into abysmal darkness in the midst of the British Association Banquet; how candles had to be used in the House of Commons; while the stupendous breakdown at the Battersea Power Station—the last word in electrical science—is too recent to need description. And still more recently—only the other day we saw in our newspapers headlines recording " Big Electricity Breakdown," " Grid Failure in Kent," followed by the paragraph: " Electric light and power were cut off from Canterbury and Herne Bay last night. Since April 1 "—rather a significant date —" the Canterbury Corporation has received its bulk supply from the Central Electricity Board Grid System. The breakdown caused the Canterbury Tanning Factory and the Corporation Irrigation Works to close down. There was a black-out for nearly four hours."

The position of people who live in what are known as " all-electric " houses, or who have been persuaded to use electricity for cooking and heating must command our commiseration, and the numerous instances of breakdowns of this kind should surely cause Public Lighting Authorities to hesitate before employing so unreliable a medium for lighting our streets.

Towards the close of last year it was announced that the electricity supply industry was to launch a publicity campaign at a cost of £100,000 of which the Central Electricity Board was to find £50,000. This campaign opened with an electricity number of the *Architectural Review*, followed a week later by an enormous electricity supplement to *The Times*.

Intensifying Gas Publicity.

The British Commercial Gas Association cannot afford to ignore this form of competition but must intensify its own publicity activities. No gas undertaking should grudge the provision of the necessary funds. The creation of an atmosphere favourable to gas by informative advertisements and literature helps every undertaking throughout the length and breadth of the land.

The Sheffield Gas Company has always been a loyal supporter of the British Commercial Gas Association through its financial parent—if I may use the expression—the National Gas Council, that most useful body over which Sir David Milne-Watson so ably presides.

But my Company, like other progressive undertakings, has always remembered the slogan that " Providence helps

those who help themselves," and does a great deal of publicity work for itself.

There are many forms of publicity all of which are good provided that they are properly planned and carried out in such a way that each form serves the purpose for which it is intended. We have no money to throw away so are very careful how and where we advertise, making certain that the printed message shall be sufficiently attractive to get home. We not only take space weekly in our two daily papers, but frequently take additional space to announce special displays and cooking and washing demonstrations, while special articles are contributed to the Press from time to time.

My Company also takes advantage of exhibitions which are held in the city and spends a considerable amount of money in this way; for although we have seven showrooms fully equipped, we know there are people who will not take the trouble to go to them but will eagerly visit any exhibition which is being held.

In isolated districts we find advertisements in Parish Magazines a good investment. Another profitable medium for advertising presents itself to us in the Sheffield edition of the *Homefinder*. Copies of this publication are passed to our Sales Department and properties advertised as " For sale " or " To let " within our area are closely investigated with a view to business.

Purchasers are interviewed before taking up residence, which generally gives us the opportunity to see that their gas appliances are in order and what changes or additions are needed. We find this service is much appreciated by the public. Personal letters with reply post-cards are sent to new residents and generally lead to business. Changes of tenancy are carefully followed with an eye to new installations. Slip advertisements are sent out with our 90,000 accounts and appropriate slogans are printed on our envelopes.

We work in close and friendly co-operation with architects and builders and keep them advised of the latest developments, sending them periodically copies of " A Thousand and One Uses for Gas " and other pertinent literature.

Then, as I have already mentioned, my Company has seven showrooms which we have fitted up with appliances just as they would be installed in any house or building so that practical demonstrations can be given and running costs explained.

The Finest Form of Advertisement.

We consider these showrooms the finest form of advertisement, but to-day all forms are necessary. We adopt the system so often recommended of following up all sales of appliances—in the first instance to see that the purchaser understands their uses, and subsequently to ensure that they are being maintained in good order so that the best results may be obtained. It is almost unnecessary to say that all these efforts would be wasted if we did not possess a highly trained staff.

During the winter months we have lectures and discussions on all that appertains to gas; nor have we neglected either the British Commercial Gas Association Examination in Domestic Gas Salesmanship or the City and Guilds Examination in Gasfitting. In educational matters we have the friendly assistance both of our University and the Sheffield Education Committee.

Some of my listeners representing large undertakings may have wondered why I should have bored them by enumerating so many, but by no means all, of the measures we, and no doubt they, find it necessary to take to promote the sale of gas in competition with electricity, oil, and coal. The answer is in two words the " Electricity Grid." Large undertakings in populous centres have for many years been successfully fighting the competition of electricity.

The Benefits of Competition.

The advent of electricity was, in my opinion, of immense indirect benefit to the Gas Industry. The competition of electricity put our Industry on its mettle; it awoke to its responsibilities, and has been enlarging the scope of its usefulness ever since.

There were no " Thousand and One Uses for Gas " until electricity came into the field, and to-day's market prices for Gas Stocks afford a sufficient indication that the investing public have no fear as to the future of our industry. But this is by the way. The large gas undertakings have fought electricity successfully in spite of State and Municipally aided competition by the adoption of such measures as I have been describing.

The electricity grid, however, is spreading its tentacles to country districts where smaller gas undertakings have hitherto enjoyed a complete monopoly. The position of these smaller undertakings gives ground for anxiety, faced as they now are with a new competition which many of them are not strong enough financially to meet in the manner I have indicated.

Amalgamations.

In the South and West of England there have recently taken place a considerable number of large-scale amalgamations, or absorptions, of smaller companies by larger undertakings, and it appears to me, as I think it does to all who have given consideration to this matter, that if the shareholders of small undertakings in other parts of the country want to safeguard their capital under the new conditions which have arisen they should seek the same remedy. Otherwise their outlook is far from bright and the survival of their undertakings doubtful.

My Company has during the past few years taken over several small undertakings. None of them could be described as badly managed, but, equally, not one was in a position to fight competition. None of them had even a showroom—a defect which we speedily remedied with excellent results.

The electricity grid has no hesitation in expressing its views on similar conditions, and last month a member of the Electricity Commission, discussing small distributive undertakings, stated that they could amalgamate voluntarily with the Commission's approval, but hinted that if voluntary amalgamations of small undertakings did not take place compulsory powers might be sought from Parliament.

The Expanding Industrial Load.

I have already drawn attention to the great difference in the position of a gas undertaking in the industrial north as compared with one in the residential south, and this tempts me to express the belief that we are on the threshold of a great expansion in the use of gas for heating purposes in industry.

This is an age when everyone engaged in industry is searching for economies by means of time and labour saving devices. The overwhelming weight of taxation in its many forms as compared with pre-war days is in itself sufficient to account for this. In Sheffield gas furnaces fed by producer gas have been used in steel works for many years, but the gas thus produced is of low calorific value, there is considerable wastage, and, apart from various other objections, labour costs are anything but negligible.

The inestimable boon both as regards economy and cleanliness of a supply of gas of high and uniform calorific value, always at command, readily controlled, the supply of which can be regulated to a nicety, no more being used than is actually required, made a strong appeal to our manufacturers. Only the question of price stood in the way, and many steel makers were, if I may use the expression, hypnotized by the apparent cheapness of producer gas.

In these circumstances some fifteen years ago, taking advantage of our geographical situation, we commenced buying coke oven gas, which, purified, can be used for all purposes. We endeavoured to meet the acute depression in the steel trade by successive reductions in the price of industrial gas when sold in large quantities, with the result that we have to-day succeeded so well in our efforts to make our steel manufacturers " gas-minded " that the demand exceeds the immediate supply.

The South Yorkshire Gas Grid.

Last year we reached a stage when we made practically no gas. Time will not permit me to discuss the South Yorkshire Gas Grid Scheme, the operation of which was entrusted to my Company by Parliament, further than to say that, under it, we are now laying mains to distant coke ovens and that we look forward to the time when we shall be taking all the available coke oven gas in South Yorkshire.

Ours is the first gas grid, but I cannot believe it is the last, and in this country the economic possibilities of long distance transmision of gas have yet to be explored. In one way or another, however, I have every confidence in what the future holds in store as regards industrial gas.

Gas v. Electricity for Street Lighting.

Turning to another matter, the question as to whether our streets shall be lighted in the future by gas or electricity appears to be more acutely controversial than ever. It is an unfortunate fact—some people might describe it as a scandal—that local authorities which do not own gas undertakings are not prepared to decide the question on its merits, and where they have an Electric Supply Department desire to bolster it up at the expense of the ratepayers.

Nothing can be said against the efficiency of gas for street lighting, and therefore the only question is, or ought to be, the one of cost. But the dice are unfairly weighted against gas in the manner I have indicated.

The public as usual are not only apathetic in matters of local government, but do not or will not understand the rights and wrongs of the matter; although, divested of technical terms, these are exceedingly simple. Not one person in a hundred—I think I might say a thousand—appreciates how rapidly the nominal candle-power of an electric lamp depreciates by comparison with gas.

In Sheffield where gas for public lighting is supplied at 1s. per 1,000 c.ft., a price with which electricity admittedly cannot compete, a wholesale substitution of electricity in place of gas for street lighting is contemplated—the electricity to be sold below cost price by the Electric Supply Department to the Committee responsible for lighting. While one may hope that this is not a sample of municipal government in general, it is an undoubted fact that many local authorities are not prepared to give gas a fair deal. "A fair field and no favour" is all we ask, and we are certainly entitled to nothing less.

Under the new Road Transport Act, which provides that a built-up area shall be deemed to commence with the first street lamp in any locality, the matter of street lighting becomes one of even greater importance than formerly. And this question of unfair treatment of gas undertakings in the matter of public lighting naturally prompts me to call your attention to the Gas Undertakings Act which received the Royal Assent at the end of the last Session of Parliament.

This Act in its final form embodied what is known as the "Kettering Clause," which gives to tenants of Council houses freedom to choose the form of light, heat, power, or energy to be supplied to them. This clause was, as you know, inserted because a number of local authorities had denied their tenants this freedom and various gas undertakings, including Kettering which led the way, had been put to the expense of going to Parliament for relief in their respective areas. And here I should like to say a good word for the Sheffield Corporation, as, though my Company has had several Bills in Parliament during the past few years, we have never had occasion to insert the Kettering Clause.

The Gas Undertakings Act contains a number of useful provisions, freeing the Industry from many of those handicaps under which it has laboured for so many years.

We owe a debt of gratitude to the Gas Legislation Committee, on whose report the Bill was founded, and in particular to its Chairman, Mr. Wrottesley.

The Combined Effort Wins.

I have no doubt said those things which I ought not to have said and left unsaid those things which I ought to have said, but the points I want to impress upon the members of this Association are:

First, we are face to face with a new and very aggressive competitor in the form of the electricity grid—a competitor with apparently unlimited funds for propaganda work.

It was in order to enable this Association to meet this propaganda by adequate counter-propaganda that I gave my signature to the letter also signed by the Presidents of the National Gas Council and of the Institution of Gas Engineers, notifying the increase to 10s. per million c.ft. of gas made in the rate of the joint contribution payable to the National Associations.

I am particularly glad to be able to state in this Address that, calculated upon the basis of make, approximately 70% of members have agreed to the increased contribution. This splendid response will go a long way towards the provision of the counter-propaganda to which I have just referred; but in order that it shall be completely effective it demands that the full 100% of members shall contribute in equal proportion. The intensified campaigns are being carried out on behalf of the whole Industry, and it is in the interests of each and every gas undertaking to find the money.

Secondly, excellently as this Association does its work, it cannot do everything, and, if the Gas Industry is to hold its own, individual effort on lines I have tried to indicate is essential. There is plenty of room for development, but time and tide wait for no man, and those undertakings which, for one reason or another, cannot adopt a progressive policy should seek the shelter of those which can and will. I look upon the existence of small and isolated undertakings as the weakest spot in our industry. We are fortunate in having in the British Commercial Gas Association a central body of great power and efficiency.

During my year of office, under the inspiration of my predecessor, Mr. Cash, and the Chairman of the National Gas Council, Sir David Milne-Watson, the Association has undergone a certain amount of internal reconstruction which I am sure has added to its strength and efficiency. Mr. Rowe, himself a tower of strength, has come to us as Manager; Mr. Walker, who was laid aside by sickness a year ago, we are glad to see back at work; and now that Sir Francis Goodenough has returned we have a full team second to none. To all of them I tender my grateful thanks, and I shall relinquish the Presidency full of confidence that under their guidance the Association will fulfil its mission no less successfully in the future than in the past.

Co-operation of All Arms

By W. D. ROWE, Manager, The British Commercial Gas Association.

The military flavour in the title of this paper is perhaps excusable, coming, as it does, twenty years after a date when "all arms" in the greater part of the world were summoned into action. No better instance could, however, be given to prove the value of co-ordination than the events which followed the pooling of the Allied resources. The co-operative Anglo-French campaigns of the later part of 1918 stand out clearly when compared with the isolated and spasmodic movements of previous years. At the same time, it must be remembered that without the spade work of those earlier individual efforts, the later joint advance would not have been so eminently successful.

Value of Individual Effort.

And so it is with the Gas Industry. For over a hundred years local and individual efforts have been contributed in all parts of the Kingdom, which have resulted in the building up of an Industry which is second to none in its desire to progress efficiently for the common good. For less than one-fifth of that time, those individual efforts have, on the commercial side, been backed up by the support of a national organization. I do not propose to deal with the technical side—it is beyond my sphere and beyond the sphere of this Conference. At the Annual Conference of the B.C.G.A. we must keep closely to commercial matters. First of all, I want to give credit to those individuals and undertakings who, by their efforts, have set such a magnificent example to the rest of the Industry. I will mention no names, but I will say that there are cases which stand out clear, and which give rise immediately, when any problem is discussed, to a query, "What are so-and-so doing?" Godspeed to them and their endeavours. There is practically no activity of this Association which they are not practising themselves, and there is no limit to the courage and foresight adopted by them as far as new developments are concerned. The Industry as a whole owes to such people and to such organizations a deep debt of gratitude. There are others who, despite all kinds of difficulties, such as limited funds, intense local competition, inability to obtain the right personnel, and dozens of other handicaps, are plugging along fighting their own battle—and the battle of Gas at the same time—with unfailing spirit and cheerfulness, and presenting to their Boards and Committees reports of progress which compel universal admiration. It will be a sad day in the Gas Industry when such splendid local efforts are in any way curbed. I have stressed this point because, although my purpose is to draw attention to the need for a common front and to plead for unified action, I do appreciate the absolute necessity of the continuance of consistent progressive effort on the part of local undertakings. Each gas area is, in a way, a little kingdom unto itself, and can no more be ruled from 28, Grosvenor Gardens, than the outposts of Empire can be ruled from Whitehall. Headquarters can help, just as Whitehall can help, by means of ammunition and advice, but the ultimate decision must be made on the spot. It is only the man on the spot who knows the local conditions, the delicate prejudices, the intense likes and dislikes of his subjects, and on him must rest the responsibility.

The Scope of the National Work.

Why, then, may reasonably be asked, is there need for co-operation? One might as well ask why does a nation

need a central government. It is surely because when a number of people are engaged in a common cause there are bound to be certain matters on which a settled plan is necessary, so that the ultimate aims of the cause may be understood by the rank and file. The aim of the Gas Industry is to produce the highest possible quality of gas, and, having produced it, to sell it. It is not for me to record here the many advantages of gas and the inestimable services it renders to mankind, because I am speaking in this hall to the converted. But there are thousands of people in this Kingdom who are either ignorant of those advantages or have, by some means or other, been prejudiced against the use of Gas. It is necessary for those of us who believe in Gas to tell the public what we know, because we believe we have in Gas a public utility of inestimable value, one which we can offer to them at an economical price, one which we know will give them increased leisure, and one which will help in the improvement of the nation's health. In these advanced days, we can no longer rely on the merits of such a boon being passed on from one to another by word of mouth, although such recommendations are the best possible advertisement. It is necessary therefore to adopt more direct means, in fact, to step right into the open and tell the whole population, by every conceivable method, what goods we have for them. To reach the great public, with its ever-changing habits and its tendency to move from place to place, it is necessary to provide a background for the individual efforts which are being carried on in individual areas. That is where co-operation comes in. The origin of the formation of the B.C.G.A. is to be found in one of the first-named Aims and Objects in its Constitution—that is, to advertise in the Press. Now the Press of this country has tended in recent years to become more and more consolidated, and newspapers with vast circulations have taken the place of local papers. Whether this is for good or ill is not a matter for discussion here, but I rejoice to think that there is still a strong locally managed provincial Press, of which the papers of this city are notable examples. To advertise in newspapers with such large circulations requires a very large sum of money, and it is only by a joint effort that advertisements advocating the advantages of our commodity can be inserted in them. Nor are newspapers the only media through which we can reach the public. There are numbers of widely circulated and influential magazines and trade and technical papers through which we can appeal to those in authority. To engage adequately in such publicity requires a very considerable sum of money, and it is, I imagine, well known that of the funds drawn by the B.C.G.A. from the contributions made to the National Bodies, a very large percentage is used for this purpose. I need hardly add that the mere fact that the Association can be regarded as a large advertiser, places us in a very favourable position in our contacts with the Press.

But Press advertising is by no means the end of our co-operative work, although it uses up so large a proportion of our money. We are able, by reason of our position as a national body, to become publishers of a considerable amount of literature. I do not think that, with a few exceptions, our members have realized the tremendous possibilities of co-operative printing. It is, unfortunately, almost impossible to please everybody, and consequently I favour the policy of issuing only publications which are pretty sure of a very large sale. We should, I think, concentrate on a mass effort, rather than dissipate our efforts on a number of small leaflets which do not penetrate. As an instance of this, the " Get-up-to-date with Gas " booklet had a wider distribution than any booklet previously issued, and two of the recent issues of " A Thousand and One Uses for Gas " have surpassed all previous issues. Work of this kind could never be accomplished without the co-operation of members.

The Need for Trained Sales Staff.

Both of these methods of propaganda rely on the printed word. And though everyone knows the value of the persuasive pen, the message does not necessarily reach everybody, nor, in fact, if it reaches them, does it always penetrate. The displayed advertisement, the editorial article, the poster on the hoarding, and the insinuating brochure all have their values, but one is never quite certain if the story they are telling is properly sinking into the minds of their readers. That public taste can be influenced by this type of propaganda is undeniable, and many instances could be quoted of the rapid advance of industries and firms which have conducted really well thought out campaigns. But there is another way by which you can be sure of getting the individual interest of those to whom you are appealing, and that is, by personal contact. I am not suggesting for a moment a house-to-house canvass, which is one of the greatest nuisances to which householders are subjected. There is no need for such a thing in the Gas Industry, for Gas is already connected to a vast majority of the homes of this country, and personal contacts with consumers come naturally in the ordinary course of business. But—I would like to ask—do undertakings pay sufficient attention to this matter of personal contact? Are there, on the commercial side of the Gas Industry, sufficient trained personnel to carry out this all-important work? I suggest there are not. In a great many undertakings the sales side is cut to the bone both as regards indoor and outdoor staffs. In the praiseworthy desire for improved efficiency in production and distribution many seem to have forgotten that we are also shopkeepers and have something to sell, and customers to satisfy. I am not making these statements without evidence. I know of an important undertaking where there is not a single outdoor salesman or saleswoman, where the showroom is staffed by two or three young women receiving scandalous wages. I know of an undertaking with an area of over 200 square miles in a good residential area where there is no member of the staff detailed to foster contacts with women consumers. What is the use of having a grand commodity like Gas and being content to supply only those who ask for it, instead of going out and telling the public what a boon you have for them. You may ask what all this has to do with " Co-operation of all Arms " or with the B.C.G.A. The answer is that the B.C.G.A. has produced and presented to the Industry an Education Scheme for staff training which has, as yet, not met with the response it deserved. I am not going to deal with this at any length, because in a later paper Mr. Terrace will tell you all about it. I want only to appeal to all concerned to co-operate with us on this matter, because without an adequate number of properly trained people on the commercial side we shall not make the progress which everyone desires.

Showroom and Window Displays.

There is yet another method of propaganda in which we seek the co-operation of members—in the matter of display in showrooms and windows. Here is another subject which needs the attention of the Gas Industry. Some very good work is being done, but there is still a great reluctance on the part of a great number to realize the full value, in the way of increased sales, which can be obtained by attractive displays. Our friends, the makers, have done a great deal in this direction, but with all due respect to them, I do feel that there is room for improvement. The tendency is still to fill both showroom and window *so* full that it is well nigh impossible to distinguish one apparatus from another. And such displays are even worse, I think, than the entirely shut-off windows which I once saw and which I now find belong to a Company whose Board think that it is below their dignity to display their wares. Good display in the showroom is not a difficult or expensive matter, and some one person should be singled out to superintend it. The knowledge that an undertaking has an attractive showroom, and, in addition, intelligent and courteous attendants, is bound to redound to its credit and prestige. Window display is another matter. It involves catching the eye of the passer-by by some deft touch—the simpler the better. This is an expert's job—window display men, even more than salesmen, are born and not made. In this connection there can be no better instance of co-operation than the services which the Association can now offer to its members. We have recently appointed in Mr. W. R. Oliver a man who has been in the display world for many years in many capacities. He is, with the co-operation of members—and I say this without any fears—going to revolutionize the gas showrooms and windows in this country. Evidence of his work is available outside this hall, and as it penetrates throughout the Industry, so, I am convinced, will the figures of showroom sales advance. Without the preparation of display ideas for general distribution, window displays will go on in the same old way, and I would ask once again, how could such work be done for the Industry without national co-operation?

Home Service.

It would be wrong of me to omit from my remarks a subject which is very much in our minds, and which is likely before long to assume even greater importance. I refer to the question of the contact between the Gas Industry and women consumers. Never before, perhaps, have housewives been so interested in kitchen planning, in labour-saving, and in their demand for neatness and attractive design. Never before has it been more necessary to bring to their notice that gas is labour-saving, that gas is up to date, that gas can supply their very wildest demands for all domestic and household services. It behoves the Industry, therefore, to do all in their power to tell them the services it can render. Here again, the personal contact is necessary. Women are your

best friends, and you must hold out a warm welcome to them, make a fuss of them, and leave them with the impression that the gas man is their staunch and true friend. I am not going to enlarge on this matter, because we have with us to-day someone who is more competent to address you on this subject—our own Mrs. Murphy. Mrs. Murphy has been entrusted by the Association with a job for which she is not only well fitted but of which I know she is going to make a huge success. We have arranged for her to say a few words to you to-day, and I am quite sure you will find them of interest. This is yet another case where co-operation is needed not only within the Industry, but within undertakings themselves. It is of immense importance that those dealing with Home Service should be taken into the confidence of those who are directing the affairs of the undertaking.

The Power of a National Association.

I have enlarged at some length on matters which, however well handled in different areas, can be strengthened by national co-operation.

It only remains for me to point out that the value of both national and local propaganda will be increased enormously if only it can be systematically co-ordinated. As far as the national side is concerned, it must be our endeavour to let our members know as early as possible what we propose to do, so that they, in their turn, may back us up by their local efforts. How much stronger is an appeal if at one and the same time the public are confronted by advertisements in their national paper, in their large district paper, in their local paper, in their favourite magazine; by attractive displays in their local gas showrooms; by the arrival in the morning post of a well-printed booklet, and the appearance on their local hoarding of a strongly designed poster. There is no season of the year when we can afford to let the public forget that there is always something gas can do for them. In the face of the many attractions offered in these hectic days of change, only those who consistently hammer home with force the advantages of their commodity will survive, and therefore I do appeal both for the continuance of support to the national work, and for intense local propaganda, and, above all, that these two efforts shall, wherever possible, be carried on in an atmosphere of mutual trust.

Finally, I would like to draw the attention of members to the power of a National Association. I wonder if this is widely understood. I often wish that, from time to time, some of those who are not conversant with the inner workings of the Association could spend a week with us at Grosvenor Gardens and just see the tremendous number of things done for the Industry which never come to light. Although I have confined myself to-day to what is done in the attack, do they know how much is done in defence? Do they know how we scan the Press for statements injurious to the Industry? Do they know how we co-operate with kindred associations where the interests of gas are involved? Do they know we can bring pressure to bear in cases where gas is attacked in print or by word of mouth? These powers are the results of your co-operation, for when we speak to those in authority and to the great British Public, it is you who are speaking. Let us speak with one united voice, and since there are so many clamouring for a hearing, let us speak loudly and from the housetops—the united voice of the Gas Industry.

Home Service

By EILEEN MURPHY

I am going to devote the short time at my disposal to hard facts.

The Gas Industry is a woman's industry. It is the biggest industry which caters for the daily needs of women.

Seventy per cent. of the gas output in this country is sold for *home* use. In other words, women are responsible for using nearly three-quarters of the total gas which you gentlemen make.

You have about 10 million women who are regular, daily customers. The men may pay the bills, just as men ultimately pay the bills for hats and frocks—but make no mistake, the women are the real customers. In ninety-nine cases out of a hundred it is a woman's hand that turns the gas tap, and makes the gas meter register the daily sale.

These women customers of yours—these ten million—are keen buyers. They know how to take advantage of competition. It matters nothing to them whether they use a switch or a tap. If they got better service from electricity than they get from gas, they would change from gas to electricity just as they would change from one shop to another.

Therefore you must make sure that your customers always get the best possible service from gas.

Just imagine what one of our "merchant princes" would do if he had ten million women customers! Think what Gordon Selfridge would do if he could have all these millions of women on his books, making daily purchases from him!

I can tell you the first thing he would do, to make sure of keeping their custom; he would engage the best women he could find, so as to keep the woman's point of view in the forefront.

There are a large number of women in the Gas Industry to-day. During the last few months I have had the pleasure of meeting some of them, and seeing their work. So I know what I am talking about when I say that they are able, and qualified, and enthusiastic, and that their work is invaluable. Their work is not a luxury. It is an indispensable adjunct to a progressive selling policy. If you are to consolidate the domestic load, you must use these women to the full.

To-day I want to make a plea in their favour. I want to ask you to give them more scope and responsibility.

An industry with ten million women customers should be able to offer brilliant prospects to the best women in the country.

And you should let your consumers know the sort of service that is provided for them. You should shout it from the house-tops that you have a host of skilled women to help consumers with all kinds of domestic problems. Is there any reason on earth why these women's activities should stop short at cookery demonstrations? No reason at all! At the end of this speech you will see that I give a list of some of the things that women are doing to-day in the British Gas Industry. Now in my view those things are worth advertising. *They make news!* They show the public that the Gas Industry is improving its service *all the time*.

I know that in the old days there used to be a prejudice against women in business. I hope that prejudice does not exist in the Gas Industry to-day. Remember there is no gender in brains. It should make no difference in business whether a person's legs are concealed in petticoats or in trousers. In fact, if any difference *is* made, surely the petticoats should have the advantage in an industry where women form the bulk of the customers!

I am making this plea because you have asked me to co-ordinate the activities of women in the Industry. I have already been to many undertakings, and I hope with your goodwill to visit all of you in the course of time. When I speak to you again, I shall hope to have much more to report. At this stage I should like to say that I have been amazed at the range, the variety, and the value of women's work in the Industry. If I, after ten years' close inside experience, have only just learned about this work—how can the ordinary consumer be expected to know of the special service which is at her disposal?

I say it is high time we had a flourish of trumpets on behalf of the women in the Gas Industry.

Women's Activities in the Gas Industry.

A composite picture of Home Service as it exists to-day, drawn from some British Undertakings.

I. PERSONNEL.

Types of Employees.

All women employees whose work brings them into contact with the public are properly regarded as part of the Home Service Section:

Demonstrators.
Receptionists.
Saleswomen.
Showroom Manageresses.
Lecturers, &c.

Qualifications.

Demonstrator-recruits are women trained in Domestic Science and Economy. Girls holding Cordon Bleu certificates obtained at a Cookery School recognized by the Board of Education are employed by many undertakings.

Preference, however, is given to those holding a First Class Diploma, which entitles the holder to give public demonstrations and to teach cookery in any school, and is an official guarantee of proficiency in all branches of housewifery.

In certain cases it has been found expedient to engage professional cooks with good private experience to carry out inspection and adjustment of cookers in consumers' houses. In areas where home-baking is still popular, women with special training in baking and confectionery are engaged.

Internal Training.

In large undertakings it is customary to give new recruits a period of special training in the laboratories and workshops. A test follows at the end of this period.

Before being promoted to the regular demonstrating staff, the probationer works for a term as a showroom assistant.

In many cases the recruits who become saleswomen are required to take the B.C.G.A. Course in Domestic Gas Salesmanship.

II. PUBLIC DEMONSTRATIONS.

In Showrooms.

A programme of forthcoming demonstrations is sent out with gas accounts.

Special invitations are sent out for cookery and other demonstrations given in the undertakings' lecture halls.

In some cases a menu of the dishes to be cooked is exhibited in the showroom window, the whole process from the weighing of ingredients to the finished production being on view.

Demonstrations comprise water heating, laundry work, and refrigeration, as well as the use of the gas cooker. Instruction in the cleaning of appliances is also given.

Demonstrations are frequently arranged at convenient times for special classes of consumer, *e.g.*, business girls, engaged girls, &c.

Tea and biscuits are generally served to audiences. Notebooks, recipe cards, and small cookery books are regularly distributed.

Silent demonstrations of cooking, laundry, and refrigeration are staged in or near showroom windows, visitors being invited to ask any questions they wish.

Full-dress demonstrations are given also in the well-equipped travelling showrooms which are used by many undertakings for sales-drives in outlying areas.

Other Demonstrations.

Many undertakings arrange for regular demonstrations in large stores on their district. A display of appliances is staged at the same time.

Demonstrations are commonly given at important exhibitions in which the gas undertaking participates. Some undertakings employ or hire women artists to execute lightning sketches at exhibitions as a draw to the crowd.

Show-flats and show-houses on new building estates provide excellent opportunities for demonstrations which often bring immediate sales.

III. SERVICE TO INDIVIDUAL CONSUMERS.

Individual Demonstrations.

New cooker installations and complaints are immediately followed up by qualified demonstrators who give the consumer every help in becoming expert on her new appliance.

These visits are especially valuable because demonstrators teach consumers to make greater use of the oven and the griller.

To avoid any subsequent complaint, demonstrators who bake cakes at consumers' premises take their own ingredients and present the cakes to the housewife.

Recipe Service.

Demonstrators are always available to suggest tested recipes to any consumer who asks. In many cases demonstrators are asked to plan bridge teas, party menus, &c.

On certain occasions demonstrators cook complete meals in the houses of consumers.

Home Planning.

A model kitchen fitted up in the showroom affords good opportunities for discussing the individual domestic problems of consumers, and for selling gas kitchen apparatus *en bloc* instead of as separate appliances.

Several British undertakings contemplate the establishment of a Kitchen Planning Service, which involves the drawing up of special plans for consumers who are modernizing their kitchens or taking new houses.

IV. GOODWILL CONTACTS.

Women's Societies.

Women employees are encouraged to become active members of local societies. Whenever possible, they offer their services for lectures and demonstrations into which gas propaganda can be introduced. In many cases the gas undertaking offers the use of its premises for special meetings of these societies, and even arranges for the printing and dispatch of the invitation cards. Visits are sometimes arranged to model factories where gas is used. Certain undertakings run branches of a Women's Gas Association.

Women's Societies with which contact is held are:

Townswomen's Guild.
Women's Institutes.
Women's Co-operative Societies.
Railwaymen's Guild.
British Legion—Women's Section.
Mothers' Unions, &c.

Sweets and cakes are given away at Charity Fêtes, Bazaars, &c., and are sold in aid of the "Good Cause." In many cases, cake weight guessing competitions are organized. Prizes are also offered for the best cake or batch of bread baked in a gas oven during the period of the Bazaar.

Welfare Contacts.

Home Service activities include close contact with Medical Officers of Health. In many cases M.O.H.'s have asked for demonstrations at Welfare and Unemployment Centres, on such subjects as gas-ring cookery and the cooking of a nutritious meal for five people at a cost of a shilling.

Women employees also visit hospitals and clinics to give advice and help.

Educational.

It is part of Home Service to keep in close touch with educational authorities; to see that gas cookery is given a prominent place on school time-tables; to visit domestic science centres and give help to domestic science teachers.

Classes of schoolgirls are welcomed by some undertakings at demonstrations and lectures. Girls' Societies (such as the Girl Guides and V.A.D.) are allowed to take their tests on the gas undertaking's premises.

Publicity.

In some undertakings the women's staff keeps in touch with the Home Page Editors of local newspapers, and useful gas publicity results.

Much more publicity will accrue when undertakings see fit to make legitimate capital out of the Home Service which they provide for the benefit of their consumers.

Gas Service in Sheffield

By RALPH HALKETT, General Manager and Secretary, The Sheffield Gas Company.

In presenting this paper to the members of the British Commercial Gas Association, I am fully aware that much of the material given will not be entirely new, since the subject of "Service" by the Gas Industry has always been one of the principal features of this Association's deliberations and activities.

It is felt, however, that you will be interested in an outline of the policy and methods used by my Company in obtaining and maintaining business, particularly in the rapidly expanding field of industrial application of gas. You will gather as I proceed that the Sheffield Gas Company occupies a unique position in the Gas Industry, and consequently has had to employ unique methods in filling that position.

As you are well aware, Sheffield is noted as the centre of the steel industry in this country, and at the present time approximately 60% of our output of gas is used for industrial heating purposes; the bulk of this gas is used in the many processes of the steel industry. Such an industrial load, obtained, maintained, and developed under particularly exacting competition with very cheap solid fuels, in an industry demanding every ounce of value, has only been made possible by extensive co-ordination of cheap gas and efficient service.

It is with particular reference to service that I wish to speak, in order to indicate how the Sheffield Gas Company has endeavoured to meet the peculiar needs of the area during the past thirty years of industrial use of gas.

These thirty years fall into three distinct periods, the pre-war, war, and post-war periods. The early part of the pre-war period saw the beginning of industrial gas heating, and from 1910 to 1914 the trade boom introduced rapid extensions to the use of gas in industry, particularly with regard to the small-scale work, such as file forging, annealing, forging of small tools, and heat treatment for hardening and tempering.

By this time, the Sheffield Gas Company's Industrial staff had actually designed new forms of gas-heated furnaces, built them, and installed them in the steel works for the heat treatment, and some of these furnaces are still among the more popular type in use to-day. The gas and air blast burner, the forerunner of the modern premixing burners, was designed and manufactured by one of my Company's Industrial Staff, and is still a very useful burner, finding favour in hundreds of furnaces used to-day in the district.

At the outbreak of war many peace-time operations had to be curtailed or dispensed with, and the entire energies of industrial Sheffield concentrated on munitions work. The demand for gas-heated furnaces was phenomenal—furnaces for metal melting, annealing and nosing shells, the shrinking of gun jackets and engine tyres, and similar processes being in continued demand—and the Gas Company's Industrial and Furnace Maintenance Departments had a responsible duty to perform.

The post-war period proved an anxious time. The inevitable depression in trade, the closing down of works, and the consequent unemployment called for far-seeing organizing ability. From the Gas Industry's point of view, the experience gained in the use of gas for steel heating of all kinds during the war was invaluable, and the post-war period represents a new era of industrial gas usage.

The Sheffield Area and its Industries.

Having given a sufficiently brief account of the past thirty years' history of Industrial Sheffield to indicate the conditions under which our industrial gas load has been developed, and to introduce details of the methods my Company have adopted to meet the unique local requirements, I now propose to deal largely with Sheffield's major industry—the steel trade and its use of gas.

Sheffield has been inseparably associated for many centuries with the making and fabrication of iron and steel, and in spite of fluctuating economic conditions and intense competition from abroad, still maintains its world-wide reputation for the quality and variety of its wares. It has been often stated that the pre-eminence of Sheffield was not due to a natural local occurrence of suitable forms of iron ore, but to the abundance of natural forms of fuel and of power. In the early days wood and charcoal, and, later, abundant supplies of locally produced coal had an important economic bearing on the competitive production and marketing of iron and steel. To-day the maintenance and future progress of the major industry of the area is still favoured by the natural occurrence of supplies of solid fuel and its consequent development into more valuable and transportable forms to meet modern industrial requirements.

The carbonization industries producing essentially coke and gas, and the various processes for converting solid fuel into gaseous fuel, have virtually revolutionized the manufacture of steel, and of very recent years the more intense and co-operative development of the fuel resources of the district augurs well for the further advancement of the steel industry.

Industrial Development and the Part Played by Gas.

Research Departments attached to big steel firms have shown tremendous activity in all branches of the trade, not only in improving upon methods of production of steels and methods of subsequent heat treatment of the articles manufactured, but of recent years upon the production of many different types of steels and alloys designed to meet the more precise and intensive industrial conditions of manufacture prevailing to-day.

All these new ventures have resulted in a multiplicity of detail. Engineering of all kinds is putting new demands upon the steel industry almost daily, but the variety of steels available to-day can more than meet those demands. In fact, steels and alloys produced in recent years have actually opened many new fields for the application of metals both industrially and domestically. The advent of these new commodities has brought in its wake many items demanding very careful consideration. In conjunction with these, the economic conditions of production and distribution existing to-day have added very considerably to the difficulties. Notable among the conditions of production is the question of fuel. Heat has always naturally been an essential to steel production, and the use of fuel to its utmost capacity has played no small part in the development of the steel industry.

As new methods of burning fuel have been developed, and as new fuels have been produced, so has the Sheffield steel industry adopted them wherever possible. Of recent years the use of gaseous fuels for steel-melting, re-heating, and heat treatment has developed phenomenally, and of these fuels town gas has been very much to the front.

Since its inception for industrial purposes, the many advantages of having a fuel available at a moment's notice, of uniform high quality, and having features which will allow of accurate control in practice, have been widely appreciated. The increasing demands on the Sheffield Gas Company for supplies of gas, especially in the last few years, leave no doubt that gas to-day is the preferred fuel.

The Need for Research.

The Sheffield Gas Company has had a Practical Demonstration Room during the whole of its thirty years' activities in industrial heating. This room has been equipped with gas-fired furnaces and equipment of a type essential to the local steel industry, which could be demonstrated under practical working conditions. Successful as this has been, it was deemed desirable—in fact, essential—that a Research Department be set up to support the activities of the Industrial Department.

With the increased intricacy of the modern steel and metal industries, problems of correct heating and processing become more exacting every day, and the activities of a Research Department staffed by suitably trained technical men, having a thorough knowledge of metallurgy, and capable of working in conjunction with men of long practical experience in the use of gas for industrial heating, are undoubtedly of advantage.

A department so staffed is of great assistance to the smaller firms in the city who cannot justify the expense of maintaining their own technical staff. Their problems of heating, processing, &c., can be brought to the Research Department and examined systematically, and their pro-

ducts can be examined and tested by the excellent equipment installed in the Department and reported upon.

Apart from this, the Research Department is actively engaged in direct research into the uses of town gas for local trades. Improvements are sought in existing methods of combustion, and new uses for gas investigated. Accounts of some of the research work jointly carried out by the Research and Industrial Departments have appeared from time to time in the Technical Press.

Much valuable assistance can be given to users of gas as fuel by bringing to their notice methods used in other countries, and also in putting into practical operation some of the extensive knowledge already in existence on the action of gases on metals, and on little used methods of combustion. Much of this information can be had from the journals of various technical societies, and a search in their journals is often well merited.

Technical Collaboration.

Mention was made earlier in this paper of the value of collaboration between practical and technically trained men, and at this stage I propose to enlarge on this subject.

The Gas Industry, in pursuing its valuable policy of rendering service to the consumers of gas, is placed in a position of peculiar responsibility, especially in its capacity of a supplier of an industrial fuel. Gas has been adapted for use in practically every trade where heating in some form is an essential process. Much of the success which has been achieved in this respect has been due to the activities of the builders of furnaces and industrial heating equipment; but without any doubt whatever the industrial staffs of gas undertakings may be credited with much of the progress which has been rendered possible in the numerous trades and processes now satisfactorily carried out with town gas as the heating medium.

In the area of any one gas undertaking there are usually many different trades requiring their own specific forms of heat application, and the industrial man naturally comes into contact with all their particular applications. Such a man, apart from his knowledge of gas supply and distribution, acquired during his training as a practical gas man, naturally becomes conversant with various processes and trades, and their individual requirements, and accumulates a wide knowledge of many trades other than his own.

It is on such men as these, the practical members of Industrial Staffs of Gas Undertakings, that the future development of the industrial use of gas depends to a very considerable extent. This has been true, and is still true to-day, that whereas in the past practical applications of gas followed a certain but comparatively slow course, conditions to-day require not only more rapid action, but also are such that considerable technical and expert knowledge is demanded. To train a man so that he has the experience of industrial application of gas of the type previously mentioned, and at the same time has expert knowledge of the type demanded by many industries to-day, a knowledge of chemistry, combustion, metallurgy, physics, &c., is an undertaking not easy to contemplate. But we have a valuable alternative. A large gas undertaking can profit by making use of the services of practical men of the type described, together with men with suitable technical training in the subjects relative to the industries and trades in its own area, and having essentially a fundamental knowledge of chemistry. By the co-operation of these two differently trained experts more rapid progress can be made than has been made in the past; but, of more importance, the Gas Industry can improve its service to consumers by co-operating in the investigation of process difficulties in a manner which has both a practical and scientific appeal. The employment of both practical and technical men in the manner already outlined is suggested as being of benefit to the larger gas undertakings; and the smaller undertakings, employing practical men on their industrial staffs, can take advantage of the services offered through the Industrial Centres of the technical men employed on the research staffs of the bigger companies.

A Central Organization.

Speaking of the Gas Industry as a whole, it is suggested that in addition to the technical staffs used by individual companies working essentially on the requirements of the local industries using industrial gas, and having particular concern with the immediate practical uses for gas, a central organization, staffed by men each having specific technical training in subjects allied to processes of combustion, in chemistry, physics, and the applied sciences, and working on the lines of true fundamental research, would do much to further the development of the use of our main commodity.

The findings of such a central organization, passed on to the various gas undertakings, could be adapted to practical form by the combined efforts of the research and industrial staffs of gas undertakings to meet local requirements as they arise.

In my opinion, the Gas Industry would do well to associate itself with the policy of other major industries of the country by subscribing as a body to the formation of such a central organization as I have mentioned, to carry out co-operative research on the uses of its commodity, quite apart from research into the means of improving the manufacture of that commodity.

At the present time we are too dependent as an Industry upon the activities of outside agencies, such as furnace builders and makers of combustion apparatus and instruments, who, willing as they are to do all they can, have not the sole interest of industrial usage of gas at heart. We should, as an Industry, be in a position to pronounce what gas is capable of doing for industrial heating and processing, and not be satisfied with selling gas for use in apparatus and for processes determined by the outside agencies to whom reference has been made. We should lead, and not follow, industrial technique and development in heating.

If such an organization could be satisfactorily determined, its activities would support and amplify the work of the Industrial Centres now operating, and would give the necessary degree of completeness to the form of service now being attempted by the various industrial centres.

Successful Co-operation with Manufacturers.

Mention has already been made of the two Departments of my Company concerned with the giving of skilled and constant service to users of gas for industrial heating purposes.

The Staff of the Industrial Department is naturally concerned with increasing the industrial load, and by far the greater part of its concern is with the many processes and trades involved in the local steel industry. So many and varied are these processes and trades, carried out by both large and small firms, that daily contact with the engineers and fuel technologists of those firms requires to be made. Much use is made of the services of the Industrial Staff by the larger firms in the city, their advice and practical assistance in furnace installation being constantly in demand.

One of the main features of my Company's industrial service is dependent upon the peculiar local requirements. In conjunction with the Industrial Department, a special department for the maintenance of furnaces in the steel works proves particularly helpful, since a staff of practical men skilled in furnace construction and repairs is available at all times. A breakdown in a furnace during production can prove to be an expensive item if the firm has to wait for assistance from outside furnace builders; but the fact that skilled furnace fitters can be had at a moment's notice from the Gas Company is very well appreciated. This department has done much to maintain and develop the excellent co-operation between manufacturers and the Gas Company.

In addition, the Industrial Staff is daily making calls upon the many smaller firms of the area, and bringing to their notice more modern and efficient furnaces heated by gas to replace existing solid fuel furnaces. In both cases—the larger and the smaller firms—a steady but certain progress has been maintained, and with the smaller firms invitations to the practical furnace demonstration room have proved to be of great benefit. The two furnace demonstration rooms are equipped with standard types of gas-fired furnaces which years of usage have proved to meet the requirements of various steel heating processes satisfactorily. These furnaces are supplied by furnace makers, and after successful demonstration has been given of any particular furnace, the inquiry is passed on to the makers of the furnace. But in many instances a standard type of furnace is not suitable. The type of heating required, the shape of the working chamber, the type of atmosphere in the working chamber, means of handling the material being heated, &c., often demand that a new form of furnace entirely requires to be designed. In such a case, the necessary research, furnace designing, and building of a practical form of furnace are carried out by the Research and Industrial Staffs of the Company, independently of outside furnace builders. A recent example of particular conditions being required will indicate clearly how close co-operation between the Gas Company, the furnace builder, and the manufacturer, resulted in a successful issue.

Solution of a Difficult Problem.

A local silver firm had experienced difficulty in the annealing of silver sheets containing copper. They wished to preserve a bright surface, but no suitable furnace or process was on the market. My Company's Research Department determined the type of furnace atmosphere

necessary, and also developed the process of carrying out the work in a furnace of particular design. The type of furnace and details of the process were passed on to a furnace building firm in this instance. An experimental furnace was built, tested, and demonstrated to the prospective customers' entire satisfaction. The work entailed close co-operation between the silver firm's research staff, the furnace building company, and my Company's Research and Industrial Departments, and resulted in a practical solution to a difficult problem.

Some of the furnaces installed in the Demonstration Rooms are equipped with temperature control apparatus. There is still a tendency among the smaller heat-treatment concerns to rely upon an operator's skill in judging the temperature of a furnace, and demonstration of the improved quality, and uniformity of such quality, to be obtained in the treatment of steel articles, using an accurately known and maintained temperature, is a very persuasive factor in inducing a manufacturer to adopt town gas as his fuel.

It may be mentioned that the electrical furnaces sold to-day are invariably automatically controlled in temperature, and it is suggested that as gas-heated furnaces can equally well be so controlled, it should be the rule and not the exception for temperature controlling apparatus to be incorporated on all gas-heated furnaces for use in the metal and other industries.

We can do much in this respect by working in closer collaboration with the makers of such controlling instruments, and with makers of furnaces and industrial heating equipment.

In addition to the visitors who come to the furnace rooms in the ordinary way, courses of practical demonstration are given to the local manufacturers in the winter evenings. The popularity of these courses is shown by the fact that over 200 people have attended each year, and invariably further private demonstrations are given, resulting in sales. Altogether, some hundreds are given in a year, the manufacturers bringing their own steel articles for heat treatment and subsequent testing. It is by close co-operation with furnace builders and by persistent practical demonstration to users of industrial fuel, coupled with technical assistance in a customer's particular requirements, that the industrial use of gas can be increased.

Mention may be made at this point of the greater co-operation resulting to-day between the various gas undertakings in the area, since the inception of the Industrial Centres. In the Yorkshire area, much use has already been made of the Industrial and Research Staffs of the Sheffield Gas Company, whose services have been called upon for many varied heating processes.

The experience of the Industrial Staff and the activities of the Research Department are at the disposal of the Gas Undertakings in the area, and it is felt that co-operation of this type within the Industry will do much to further the use of gas for industrial heating generally.

Gas in Competition with Other Fuels.

In the Sheffield area—as in other large industrial areas in the country—we are faced with competition with most other forms of fuel, but of these, solid fuel and producer gas offer the greatest opposition. Oil is very little used, since we are in the happy position of being able to offer larger quantities of gas at thermally competitive prices with the cheapest fuel oil, in addition to offering a fuel which has decided natural advantages in practical application. With solid fuels at the present time the principal determining factor against gas is the cost of replacement of existing solid fuel fired furnaces. To overcome this, considerable attention has been given recently to the suitable alteration of design of existing furnaces to incorporate the latest type of gas burners. Conversions of this type have proved very popular, and in many instances heavy duty furnaces have been changed over from solid fuel to town gas.

With producer gas, of course, it is only the very big firms with whom we need to deal. The essential factor in this case is primarily one of cost per therm, and, as has already been mentioned, supplies of town gas are available in large quantities at a thermal price equivalent to the cost per therm obtained by the best producer practice in the district. During the past two years many conversions have been made from producer gas plant to town gas supply, and several very large contracts have resulted. One of the most efficient billet furnaces in the district is one converted from producer gas to town gas.

With the re-organization of the steel industry at present being conducted among the larger firms in the district, town gas is being incorporated in practically every branch of heating, and batteries of new gas fired furnaces are being installed.

In spite of very cheap terms offered for the use of electrical energy in the district, the amount of electricity being used is exceedingly small, and may be said to be practically confined to certain forms of special steel melting, and to the tempering of certain special steels.

Since the introduction of special systems of atmosphere control, attempts have been made of a comparatively simple type to render electrically heated furnaces suitable for heat treatment without damage to metal, and in most cases town gas is the medium used in some form or another. Considerable progress has been made, as you are probably aware, with the atmosphere control system developed by the Sheffield Gas Company, and this further advantage of town gas is proving to be a very important factor in meeting competition with solid fuels for heat treatment work.

Further Possibilities in the Industrial Field.

The possibilities of increasing the use of gas for industrial purposes in the Sheffield area in the future must be considered in the light of present indications. It has become very apparent in the last few years that fuel in a gaseous form is preferred to any other source of heat for steel heating purposes. Enlightened industrial users of fuel appreciate that town gas, even apart from its initial cost per therm, has other features which are a decided economic advantage. These advantages have been reiterated many times by the Technical Press and in lectures, and need not be detailed again here, but in Sheffield we are in a position of having gas available for large scale consumption at initial costs which on a thermal basis alone are competitive with other industrial fuels.

Such a condition is certain to create a demand for gas of such dimensions that particular attention requires to be given to the means of rendering such gas available. In addition to the availability of a cheap fuel, and having acknowledged over-all advantages, gas-heated furnaces are now on the market designed for most of the large-scale heating processes, such as continuous furnaces for heating of heavy billets. Special flame systems are incorporated, and heat salvage methods are used in such a way that considerable economy in fuel is certain. It is believed that in the very near future much of the heating of steel in heavy sections, which is at present done by solid fuel or by producer gas, will be done by cheap town gas.

It is to the smaller firms that considerable attention still requires to be given. Not being able to take advantage of the cheapest gas available, it is essential that they be approached from the standpoint of heating efficiency. Much has already been done in this direction, but more efficient furnaces still require to be produced, especially for such processes as small-scale forging and heat treatment. The elimination of spoiled material, the elimination of scale, and the consequent saving of grinding and pickling costs, make a powerful appeal in these cases, and are rapidly being appreciated. In short, it is the control possible with town gas, control at all stages, which, when completely adopted, will increase the use of gas by small industrial consumers. The problems of atmosphere control and temperature control are receiving much attention to-day, and by consistent and persistent demonstration of these two features, in co-operation with the manufacturers of furnaces and makers of temperature indicating and controlling instruments, it is expected that much headway will be made.

The Contribution of Gas towards Smoke Abatement and the Welfare of the Worker.

The problem of smoke pollution in Sheffield has been very acute for many years, and a great deal of valuable work has been done in the district by the Sheffield, Rotherham, and District Smoke Abatement Committee. The steel manufacturers of the area have co-operated and assisted financially in a Smoke Abatement Research Committee specifically to determine the value, if any, of the presence of black smoke in certain furnaces for the heating of steel. Quite apart from the activities of the Smoke Abatement Committee, the Sheffield Gas Company and makers of gas-fired furnaces have pursued a policy of producing suitable furnaces for steel heating to replace those forms of furnace in which black smoke is produced, and to-day there is no process of steel heating which cannot be perfectly satisfactorily carried out with town gas. Annealing and sheet normalizing, the two processes which have previously caused most of the metallurgical smoke nuisance, are being done in many of the larger works with town gas fired furnaces, and the steel has lost none of its famed " Sheffield Finish."

The gradual replacement of solid fuel fired furnaces by gas-heated furnaces is the most certain way of eliminating the nuisance of black smoke, and it is suggested that a change over to town gas will yield more positive results

than the adoption of intricate and complicated forms of attempting the complete combustion of solid fuels. It is suggested that a closer collaboration between the Smoke Abatement Society and various Smoke Abatement Committees in the country, and the gas undertakings, particularly those in large industrial centres, would do much to further the abolition of the smoke nuisance.

Other factors than mere prevention of black smoke are to be considered, notably the preservation of a good surface to the steel being heated, the elimination of labour and fuel economy. The adoption of gas for industrial heating purposes in Sheffield will ultimately have a decided bearing on the prevention of smoke pollution, and as trade continues to improve and more money is available for replacement of obsolete solid fuel furnaces by gas-heated furnaces, the smoke pall of the steel industry will steadily disappear.

Naturally, such a state of affairs, the absence of smoke both inside and outside the works, will influence the workers in the city very much for the better. Healthy and clean conditions under which to work have been the objects of many years of factory and workshop reform, and there is no reason whatever why the steel worker should not enjoy equally clean and healthy conditions in the foundry and heat treatment shop as the office worker in a modern works.

There is no doubt that as gas is more widely adopted for industrial processes of all kinds, smoke nuisances and their evils will gradually disappear, and gas will have added still further to its present service to its users by making industrial centres cleaner and brighter for the community than they are at the present time.

I am confident that, apart from the large industrial centres, there is an immense field for industrial gas in many of the provincial towns, and it will only be through our united efforts that the great Industry we serve will still further advance.

Discussion.

Dr. E. W. Smith, C.B.E.: I am glad to have been asked to propose a vote of thanks to my friend Mr. Halkett for his paper. Sheffield is recognized as one of the pioneers of the use of gas for industrial purposes. The Sheffield steel people would like to have gas at a very much lower price. Mr. Halkett is now giving them cheap gas, as cheap as 2d. per therm. In my opinion there is not the slightest justification for any reduction of price below that which Mr. Halkett is charging, and any attempt to obtain gas at a lower price for any purpose in the steel industry, in competition with coal and coke, is only an attempt to make increased profit at the expense of the Gas Industry. I feel very strongly that if in our towns and cities we are going to develop industrial gas we must get together more. We heard Sir Francis Goodenough say this morning that every individual should do all he could in his own district; and Sir David Milne-Watson has said that we must not take that too literally, but that it is necessary also to support the central bodies in order that the local bodies should be more efficient. I agree that we have to do both to the limit. It is impossible for local bodies to get the best out of their organizations if they have not the advantage of the experience of the industry as a whole, and there must be very definite direction and assistance from Headquarters, even greater than we are getting to-day—which is very great.

In connection with industrial research, I feel that the need for true research—I mean fundamental research in connection with combustion—is negligible to-day; there is so much information available, not only in our own archives but in those of other institutions and professional bodies, that if we employ highly qualified technical men to co-ordinate it, we shall find that it is enough to be going on with for quite a long time. Further, it is recognized, I think, by Headquarters and by committees considering this question, that it is fatal to try just to assemble together all the information available from individual experiences in individual undertakings, and that what is wanted is that qualified technical, scientific, and experienced men should sift this material and satisfy themselves whether there is enough evidence of the validity of the technical facts that we could disseminate. I have been asked recently, for instance, how much it costs to melt a pound of brass when doing it at such and such a rate. It is quite easy to say that so many therms would be consumed per pound. But that would be quite misleading, as all industrial men know; the quality of the brass, its cleanliness, its size, its rate of oxidation, and a hundred and one other factors control by almost 100% the quantity of heat necessary to melt brass. That applies to practically every problem in industry, and particularly in metallurgical industries. Sheffield has had its opportunity, and it has a greater opportunity in the future, largely because in the past nearly all metallurgical processes in Sheffield have been run by rule-of-thumb methods, handed down from father to son. With the development of new and smaller processes the more technical men have appreciated what gas could do; they have appreciated the scientific facts, and the reasons for things have been known. Just to the extent that in Sheffield they are getting away from the rule-of-thumb methods (to a very large extent through the wonderful laboratories of the Gas Company), they are appreciating the necessity for precision, and that precision is more important than actual fuel costs.

Metallurgical Outlet.

Mr. H. E. Bloor (Engineer, Manager, and Secretary, York Gas Company), seconding the vote, said: In York, unfortunately, we have no metallurgical outlet for gas, and to me it is interesting to note that in Sheffield no less han 60% of the total output of gas is sold for industrial purposes. I wonder if Mr. Halkett could tell us how much of that industrial load is used in the metallurgical industries; it would be interesting to know the extent of the industrial use of gas in Sheffield apart from the quite peculiar and special case of the steel industry. We cannot all have Sheffield steel in our areas.

There does seem to be in our organization one definitely weak spot to which the central organization Mr. Halkett has advocated should direct its attention. I have urged the fact that there are in industry many processes for which machines are supplied by certain manufacturers—for instance, machines for the baking and printing trades—the machines being sold with heating equipment. The Gas Industry does not appear to have machinery for approaching manufacturers of industrial plant, inducing them to consider and use gas, and assisting them in the application of gas to their peculiar needs. It seems to me that both the oil and the electrical industries are in closer touch with such manufacturers than is the Gas Industry.

In assuring Mr. Halkett again how much I admire the work he has done, I hope that he will not give his whole thought and attention to the industrial load, but will devote some of his enormous energy to helping us in the domestic field as well.

Mr. William Cash, J.P., F.C.A. (Past-President; Chairman of the Bournemouth Gas and Water Company): It is stated in the paper that the experience of the Industrial Staff and the activities of the Research Department of the Company are at the disposal of the gas undertaking in the area, and Mr. Halkett states that co-operation of this type within the industry will do much to help. I think sometimes it is as well to remember that co-operation in the Gas Industry—inasmuch as each gas undertaking has its own area to administer—does not lead in any sense, as in ordinary commerce, to competition; any advantage which one undertaking can pass on to another does not re-act to its own detriment. The loyal standard of work we find in the industry to-day can be carried further, I am sure, on the lines suggested by Mr. Halkett, with great advantage to the Industry as a whole.

Amalgamations.

I should like for a moment to speak on the matter of amalgamations. It is a matter which is interesting a great many of us; and some of us are in one sense a little concerned about what is taking place. There are what I may term real amalgamations, such as those which occur when your Company, Mr. President, and many others, take over smaller undertakings; I mean real amalgamations in the sense that a whole undertaking has been taken over, and very often there are direct and immediate advantages, the larger undertakings being able to supply at a very different figure from that at which the smaller undertakings are capable of working. Those are physical amalgamations. Then there are amalgamations for the joint working of similar undertakings, whereby they get larger experience and staff, and so on. But there is another class of amalgamation, which, for want of a better term, I will call "financial combination;" and those are troubling some of us. Where those amalgamations take place, and where a smaller undertaking may be put into the position of what I will call "temptation," by reason of the price obtained, not really from what I call the Gas Industry, but from outside sources, I think a real difficulty does arise. The whole policy of the Gas Industry, extending over a very long period, has been one where finance has been exceptionally and markedly clean—I mean that the Gas Industry has never been a party to company promotion, to promoters' profits, and that sort of thing. I do think there is some danger of these amalgamations or combinations, or whatever you like to call them, being put forward and carried through, not in the interests of the Industry as a whole, but in the interests of certain persons who are anxious to make money by the transactions. In such cases, of course, those who direct the operations of the smaller undertakings, or of any undertakings which are approached on those lines, are in an extraordinarily difficult position, but I do hope—and I think that probably I may be speaking for a good many people in the Gas Industry—that those temptations will be resisted if they are not really in the interests of the Gas Industry.

It is quite true that on certain lines the consumer is amply protected; on the other hand, oved-capitalization by the addition of heavy preliminary expenses or promoters' profits must impose a burden on the particular undertakings which must be to its detriment in years to come, in my humble opinion.

As Sir David Milne-Watson pointed out this morning, one bigger concern with which he is associated has already made a reduction in the price of gas to the consumer, and I am not surprised to hear it; it is the operation of the sliding-scale. But we should all consider the risk on the other side if this policy is carried too far, and on bases which are not entirely desirable.

Holding Companies.

Sir David Milne-Watson (Governor of the Gas Light and Coke Company, and President of the National Gas Council): In case there is misunderstanding, I would say that I agree heartily with Mr. Cash's point of view. As, I suppose, the holding Company of which I am Chairman was the first in the field, I think you would like to know that that *is* my point of view. It is

absolutely essential that a holding Company should be gas-minded [" hear, hear "]; we have endeavoured to ensure that in the South Eastern Gas Corporation, and, as I said this morning, with a considerable amount of success. Unless a holding Company is going to be gas-minded it is going to be a thoroughly bad thing for the Industry. This is one of the chief reasons which led the Gas Light and Coke Company to take an interest in the combination which has been formed in Kent. I am, just as much as Mr. Cash and a great many other people, a critic of rash financial interests taking over companies for financial reasons; in that way lies nothing but trouble for the Gas Industry in the future. I have taken the opportunity to make it quite clear to the Gas Industry that I hold just as orthodox views as have been expressed by Mr. Cash. I do hope, with Mr. Cash, that those of you who may be tempted in any way to yield to the financial interests will preserve a tight upper lip and agree that the best thing to do is to refuse these offers, which I am sure will not benefit the Industry or yourselves.

Mr. R. H. HEMS (City of Birmingham Gas Department): Naturally, there are many trades in the Birmingham area which resemble very closely those of Sheffield, and we have to watch very closely the work that is done in Sheffield. There is no doubt that much of the work done here is of very great value to us, and I think I can say in reciprocation that quite a large amount of the work done in Birmingham is of great value to Sheffield.

There are two points which arise out of Mr. Halkett's paper in respect of which I feel envious. The one is that Mr. Halkett is in a position to sell gas at a cost basis which is thermally comparable with that of the products of most of his competitors. Another significant statement in the paper is that oil is very little used in Sheffield. It should not be, in a coal-producing area of this kind; but Mr. Halkett's experience is not common in every big industrial centre and in many other parts of the country.

Perhaps the main picture portrayed to us in Mr. Halkett's paper to-day is in regard to the work, and the future work, of the Industrial Development Centres; and I think Mr. Bloor has given us a key to the great usefulness of that work, when he mentioned making contact with appliance makers in various trades. It is one of the big points that the Technical Sub-Committee, working with the Joint Co-Ordinating Committee, is making contact. The Gas Light and Coke Company and we in Birmingham have endeavoured to make contact, and now that we can proceed as a strong Committee representing the whole Industry our position is very much strengthened. During the last few weeks I personally have had evidence that the work is bearing fruit in one particular branch mentioned by Mr. Bloor.

Mr. HALKETT: There is no one in a better position than Dr. Smith to talk on the industrial gas subjects, and I am very pleased to hear that he thinks a research department should be set up. I am thoroughly convinced that if we want to make headway in that direction we must have more research work.

With regard to the quantity of gas used for metallurgical purposes in Sheffield, I should estimate it at about 45%. Our industrial load is increasing by leaps and bounds. I said that 60% of our output represented the industrial load, but the figure is nearer 65%. In 1933 there was an increase of 7%, and on the top of that we are heading for something like 14 or 15% increase this year. I am satisfied that it is the industrial load which is making the headway. I should think our increase will be equivalent to the whole output of Rotherham—and they are doing exceedingly well.

We do not forget the domestic side; I realize that it is absolutely necessary that we should keep up to concert pitch in that sphere, and I am pleased to say that we have a very, very live department for the sale of fittings for domestic use; this year our sales are up by thousands of pounds, so that we are not neglecting that side of the business.

We have a big industrial load before us, and we are extending our grid main to pick up two or three further colliery supplies. I am confident that before we have finished with the industrial load we shall take every cubic foot of coke oven gas in South Yorkshire. By the end of 1934, I think, we shall have an output constituting a record for the Company, even including the war years.

Labour and the Gas Industry

By the Right Hon. J. R. CLYNES, D.C.L., President of the National Union of General and Municipal Workers.

The development of the Gas Industry supplies some proof of the paradox that there is nothing permanent but change. The introduction of gas was considered in the first instance with both suspicion and alarm. For some time there was widespread incredulity and undisguised fear of serious personal and public danger. It was condemned as a nuisance where it was not ridiculed as the freakish invention of unbalanced minds.

There are very few instances in the field of material progress which afford now such evidence of far-reaching advantages in most countries in the world. I, who know nothing of the technical, chemical, engineering, and research branches of gas manufacture, can all the more freely acknowledge the high quality of the service which has been rendered. It is our habit to accept every improvement and each additional convenience with little thought of the years of experimentation and scientific endeavour required to supply us with a concrete instance of social progress.

Our acknowledgments are due to thousands of Students and Thinkers who with first-class creative minds have shown great perseverance, patience, and skill in providing a revolution in our old-time methods of supplying heat and power. Gas is one of the few modern agencies which can claim an arresting variety of service in the domestic, industrial, and social life of the country.

Gas Power and Social Progress.

No single invention has done so much on the one hand to reduce or avoid Domestic and Industrial labour which was irksome and wasteful, and on the other to cause demands for innumerable forms of labour of the most constructive and serviceable kind. No other single service has done so much in the intimate household sphere or has brought to the womenfolk and mothers of our country ever-increasing blessings in lessened toil and untold relief from household drudgery.

The peculiar and increasing advantages of gas service in the home cannot always be measured in figures. Figures might reveal a few facts relating to prices and household economy. But it is in unnecessary labour eliminated and material comfort gained that the benefits resulting from the use of gas must be measured.

In point of time saved, cleanliness enjoyed, with a consequent increase in standards of health, hygienic benefits, and greater comforts, it can truly be said that in every household Mr. Therm is in the best sense of the term a paying and serviceable guest.

Modern gas supply has also entered into the question of house planning and construction. The utilization of space and the saving of expense in building appointments for smoke conveyance and other uses have not only added to household convenience, but helped in some degree to keep down the rents for wage-earners' houses. Every change which brightens the home and reduces the task of keeping it clean has a definite family value.

This value is the common property of thousands of mothers whose work is diminished by mechanical devices, and the value is enjoyed also by a few million younger women who must spend much of their time in the home.

Although class and Party divisions are extensive enough in this country they are less deep and bitter than they are known to be in some other countries. These divisions are happily unknown in the development of our great public services, and particularly in relation to the use of gas for the common benefit. A Labour majority anywhere does not lessen enthusiasm for gas development, and a Conservative Council wherever it may be will very likely act precisely in the same way as would a Liberal or Labour Council.

Sheffield, for instance, has been in the front rank of Labour Municipal activities, and of Sheffield we read that "the consumption of gas goes on increasing at a phenomenal rate."

I have further read in the *Economist* that most of the appliances which the Gas Industry puts out to-day embody new principles. Ten years ago neither the gas refrigerator, nor the panel fire, nor the automatically-controlled cooker was on the market. They were all new products; and as such they raised new sales problems. These problems were met by a vigorous commercial policy. Improvements were effected in the design and finish of all appliances. Easy payment terms were arranged. At the same time the recruitment and training of sales staff was thoroughly reorganized.

Housing Improvements.

Of the ten million consumers of gas, more than half receive their supplies from the penny-in-the-slot meter. Many of these have been directly affected by recent housing schemes. The Gas Industry has played a remarkable part in promoting the better living conditions which are the aim of all housing policy. An overwhelming proportion of the new houses built under local schemes have been piped for gas and fitted with up-to-date labour-saving gas appliances.

The humblest wage earners are entitled to come within

the reach of every invention and of each new plan for lessening their labours, especially when away from the scenes of their ordinary toil. Their right is not only recognized in their own interest, but because that recognition multiplies the mass of gas consumers and in turn tends to cheapen the retail supply to people of slender means.

Peace in the Industry.

It is remarkable and also highly satisfactory that extensive and continuous alterations in the processes of gas production have been carried out with a minimum of friction or conflict between employers and employed. We have not, of course, been without cause for dissatisfaction on the workmen's part, and demands for forbearance and caution in the handling of disputes have become part of the equipment of those who represent the two interests, and who must think of a third great interest—the interest of the consuming public.

It is on the whole correct to say that those who have had to discuss and decide the disputes which may have arisen have displayed high qualities for giving to their following the best advice and guidance which experience and understanding could provide.

An Industry which employs directly about 115,000 workmen and which is affected somewhat by seasonal changes must be prepared for occasional incidents and for some discontent. Discontent may arise from real grievances and out of them may spring instances of actual trouble. It is a good thing, therefore, to be able to say that the Industry is prepared. The worst thing in any enterprise is never to expect trouble or to assume that conditions are so perfect that difficulties will not occur. The better plan is to prepare for the uncertain, and to be ready by organization and machinery to adjust troubles which seldom can be altogether prevented.

In the Gas Industry there has long been the National Joint Industrial Council with Regional Councils and with the necessary preparedness through Officers and representatives to come together for discussions, adjustment, and decision. Decisions which give satisfaction to everybody and everything are, in this world, very rare, if not unknown. But if we cannot always attain the best, the next best is worth trying for.

Workmen for the most part labour or move in a very narrow circle, and as a rule are not in a position to measure the service of their superiors. They cannot know the part which brains fill in the pursuit of trade and business. Managers, Superintendents, Designers, Inventors, Directors, and the like are far removed from the operations of the men. The complex aspects of industry and its National and International problems are beyond them. Nevertheless, I would say to workmen who demand that Capitalists should be fair to workmen that they ought to be fair to each other, and that other men who have been denied the advantage of education or special training but who have shown a rare natural aptitude for particular service should be given their chance for advancement.

Mutual Obligations.

Employers cannot now be content with asking what is the least on which workmen can live. They must ask what is the most which industry can be made to afford. A satisfactory answer to that question cannot be one-sided. Workmen must help to answer it, and to that end they should have regard, among other things, to—

Good time-keeping.
The avoidance of waste in materials and energy.
The ready use of new processes and inventions.
The acceptance of workshop authority to ensure standards of reasonable discipline.
The exercise of care in the choice of those who must act for them as Officials.

The observance of Rules to ensure fairness between different groups and grades of workmen and workmen.

Commercial, financial, and trading conditions mean that the best employers can go little ahead of the worst. The influence of markets, prices, and conditions of production see to that. It is by pursuing a fine co-operative purpose that both sides can extract the best from industry on the largest possible scale.

There has, I think, been much loose and inconsiderate argument concerning the position of workmen in sheltered occupations. The fact that certain workmen employed in trades subject to home or foreign competition whose pay and conditions are not as good as others has been used in efforts to make worse the conditions of men in "sheltered trades." This is an outlook not to be defended because it tends to drive conditions in the direction of the worst instead of the best.

It is no favour to a workman if the industry which he sustains provides him with better conditions than men who must endure the worst pay and hours of work in the service which they follow. Comparisons, therefore, concerning conditions and wages are often unfair as between public employees, gas workers, railway men, postal servants, and the like. A similar comparison is never applied in the case of the capital invested or the remuneration for men in the higher services, and it ought not to be used in the case of workmen.

There are times when great groups of workmen feel that no matter what the remuneration may be, other considerations must enter into contracts of service or the job will not be worth doing. Wages are not the only form of remuneration. If wages are designed to afford the necessities of life, other endeavour on the employer's part must furnish in the workshop some of those amenities and humanizing refinements which ought not to be deliberately withheld.

There are many forms of laborious and dangerous toil which if conducted without regard to the well-being of the men engaged in them tend to harden the natures and brutalize the minds of large numbers of workmen.

Welfare and Freedom.

What is commonly termed "welfare work" has often suffered and has been under-valued because of a wholly mistaken idea as to motive. The belief has prevailed that well-intentioned changes were prompted by a desire to extend some patronizing charity to the workers, or have been designed merely to enhance the employers' interest. In other cases, with perhaps a degree of truth, it has been said that these provisions were intended as a substitute for Trade Union organization or were designed to create diminished interest in provisions for self-defence where people were employed in large numbers.

I have never objected to any plan for supplementary provisions or payments to workmen as periodical additions to their wages, or as acknowledgments for high standards of personal conduct and good workmanship. Indeed, under this head I would like to see mutually acceptable extensions of schemes which relate to Old Age Pensions and Superannuation. But no plan should ever be forced upon workmen, or be used to deprive them of complete liberty of individual or collective action concerning conditions of employment or pay. Their freedom to organize as they think proper and appoint men of their own choice to defend their interests must remain unimpaired.

In some other lands liberty as we know it here has gone, and it is not partizan feeling which prompts me to say that. Authority has become a tyranny. Dictators have by various devices assumed a power greater than Emperors formerly exercised. Peoples have not only taken leave of their liberties, they appear in some places to have taken leave of their senses and to accept humiliating conditions of obedience which in this country would be regarded as degrading. It is not a boast, but a simple truth to say that in this land we would feel a dejection of heart and a degradation of spirit if we had to forfeit the personal and intellectual freedom to decide our affairs by majority methods. Liberty to us is not a thing of sentimental value. It is a priceless possession which the British character has elevated high above the purpose of any class or party.

There is no good or enduring substitute for the representative Government which enlightened communities must provide for themselves. That provision is no doubt faulty, contentious, and often unsatisfactory, but though the Britisher is frequently thought to be lacking in humour, he would rock with laughter if, for instance, he were invited to vote in a contest where only one candidate was allowed—especially if he knew beforehand that failure to vote for that candidate would involve him in serious individual risk!

Peace Essential to Prosperity.

Gas is now often referred to in relation to the dread and terrors of another war. It is a power which in various forms is mentioned because of the devastating work it can be made to do. I am sure that a few words on a supreme matter of common concern will not be deemed out of place, and I feel assured of complete support in the view that world peace should be maintained. I do not believe that any man in any class can be so depraved as to desire war, but unhappily in this life people often get what they do not want. We want, I trust, to expand the use of gas power for the useful and humane objects of its inventors, and we want to live at peace with other peoples whose future contentment would, like our own, be shattered in the wreckage of another war.

International ideas abound in every country. They are behind the activities of trade, sport, finance, travel, and

a fine educational purpose. If in all these respects international action is advisable, international action for peace should be continued. Without lasting peace we cannot permanently prosper. For though war confers some artificial and temporary benefits upon a few, it is a ruinous conflict for the great majority. It leaves a crushing debt, produces economic and intellectual upheaval, millions are massacred, and millions of other people survive only to live in misery. Countries are distracted, revolutions are fomented, and international enmity is usually increased both by the war itself and the so-called settlement which usually follows. Traders, employers, business men, and thousands engaged in professional service are distracted because of the effects on capital, investments, markets, and commercial and trading prospects. Thousands of leading business men in some of our principal industries have been ruined because of the last war, and perhaps no class has more to lose by international conflict than the manufacturing, trading, and business community.

Peace depends upon National and International policy, and upon accepting the view that war as a method for settling anything has failed. Civilized peoples ought to reject a practice which involves the futility and the waste of fighting, to be followed by patching up a peace after all sides are crushed and exhausted by ghastly losses of human lives and by wasted wealth which ought to be better spent. No single nation can guarantee peace, but for ourselves we can press the opinion that peace is necessary not only for our moral elevation but for our material prosperity and internal composure.

Education in the Gas Industry

By JOHN TERRACE, M.Inst.C.E., M.Inst.Gas E.

Part I.

THE OBJECT OF THE PAPER.

Education is a definitely personal work and may vary between wide extremes of effectiveness and worth. It is good only when it aims at the right kind of product and when the means it adopts are well adapted to secure the intended result and are applied intelligently, consistently, and persistently. It has been defined as "an attempt on the part of the adult members of a human society to shape the development of the coming generation in accordance with its own ideals of life." This may not always be accepted as a good definition, but it appears to the writer to point the way in which Education in Industry must be evolved. The decision as to what is required, and the means of providing it, rest with the "adult members" of the Industry concerned.

In the case of technical education in the Gas Industry the members of the Institution of Gas Engineers, knowing themselves from experience the most suitable training for those engaged in the manufacture and distribution of gas and its application to many processes in industry prepared a scheme which included training in the fundamental sciences suitable for the Manufacture and Use of Gas. They took advantage of the technical colleges already in existence where the necessary science teaching was available and decided which subjects, and grade of each, were most suitable, and prepared syllabuses in the main subjects of Gas Engineering and Gas Supply, and the Scheme has proved very successful.

It is suggested that a similar procedure should be followed by those responsible for the commercial and sales side of the Industry; and the main object of this paper is to provide an occasion for them to give their views on the recruitment of staff and the provision of the necessary specialized education applicable to that side of our Industry. To facilitate this and to place on record what has already been done towards Education in the Gas Industry, particulars are given later in the paper of the Schemes of the Institution of Gas Engineers and of the British Commercial Gas Association.

Quite a large number have taken the Gas Salesman's Course provided by this Association, and this along with the technical training provided by the I.G.E. Courses may be considered by some sufficient to meet the needs of those engaged in the development of the sales side. Even if it were, it is submitted there is still a large number engaged in the Industry who would welcome the opportunity of instruction, and to whom it would be of the greatest advantage to gas undertakings to give facilities. On this important view the writer now puts forward a few points—mostly suggested at different times by those keenly interested in the subject—and it is hoped that a consideration of them and the statement by different speakers of what they are already doing and what they think ought to be done, may provide a useful discussion.

The education of the clerical staff of gas undertakings will, up to a point, no doubt follow the ordinary lines of commercial training applicable to all businesses, but there seems little doubt that in addition it should include a reliable and general knowledge of the Industry. This applies even more to those engaged in our showrooms, and to those who are coming daily in contact with consumers, such as inspectors, meter readers, and fitters. It is therefore thought that classes might be arranged, where in addition to a general knowledge of the Industry, which could be made to include much that is of general interest, descriptions could be given in simple semi-technical language of the applications of gas to domestic and industrial problems. For more advanced students, more elaborate instruction could be given and, to distinguish it from the more elementary course, it would be given a different name.

Although it is suggested that these should be called classes, and that they should preferably be held at the Technical Colleges, they would be more in the nature of popular lectures. A generation ago "Spiders," "Ants," and "Astronomy" were used as subjects for lectures, and presented in such a simple but interesting form that large audiences were attracted. Surely it should be possible to arrange instruction on subjects of interest to our staffs in some similar manner. They might be presented, for instance, as "A Day at the Gas-Works," "How a Gas Meter Works," "How Domestic Hot Water Supply is Provided," and so on. The first requires no enlargement here, except to say that, while teachers in day schools often ask for their scholars to be shown over the gas-works, and give them a lesson in preparation for their visit on how gas is obtained from coal, it is doubtful whether more than a small proportion of those engaged on the clerical side or in the showrooms of gas undertakings have ever been given such an opportunity. That it is worth while giving the children such an opportunity will meet with every gas man's agreement, but how seldom it is that similar facilities are given to our own employees who happen to be engaged in other branches than that of manufacture. On the second, the "Gas Meter," reference could be made to how gas was charged for before meters were invented, how the wet meter measures the gas made at the works, the great care that is taken in the making of gas meters, the interesting conversion of reciprocating into rotary motion, how the meter is tested and the limits of error allowed, the fact that it is stamped and is a legal measuring instrument, &c. How a meter does not register therms directly could be made a reason for explaining what a "therm" is, and a few simple examples given of conversion from cubic feet to therms, the opportunity being taken of explaining what the calorific value of a gas means.

The third example would take several lessons to cover the subject. First of all the general arrangement of a coke boiler, circulating cylinder, and supply tank could be explained—and it is surprising how few people know the principle on which it works and how many would like to know—then a gas-heated boiler in place of that using coke would introduce the bunsen burner. This in turn would lead to the use of the luminous flame burner and to geysers. The main point to be observed in lessons of this type is the opportunity given of showing in detail and explaining how the apparatus works which we supply. This is most important and should be observed all through the course.

In such a manner much useful knowledge could be imparted to a considerable number of the staff, who would, no doubt, be quite ready to air their knowledge on suitable occasions. The value would, of course, be much greater to the Inspectors, Meter Readers, and Fitters. That there is no great novelty in the suggestion of the necessity of getting this information across to those directly engaged on the Sales side is evident from the inclusion in the first Regulations of the B.C.G.A. Gas Salesman's Course of the subjects "Gas Technology" and "Economics of Gas Supply." Unfortunately very little progress was made in the establishment of classes, but there seems no reason why this instruction should be confined to those qualifying for a Domestic Gas Salesman's Certificate.

A very strong plea is made here for extension of education to cover a wider field, and that it be for education and not for examination. If gas undertakings for the

purpose of encouraging attendance decide to refund a portion or the whole of the fees to those who can show that they have benefited by the course, they may use an examination, the writing of essays, or other means, but it is not suggested, nor indeed is it desirable, that certificates should be granted.

It would be well to mention some titles by which the Classes, Lectures, or Courses should be known, and there seems no objection to using the titles already established of "Gas Technology" and "Economics of Gas Supply," and it is suggested that the former be used for the elementary and the latter for the more advanced course, thus obviating the use of such terms as Elementary, Junior, Advanced, or Senior. It will be observed that beyond the extension of the field of application and a few suggestions as to the nature of the syllabuses, there is very little proposed that was not envisaged when the B.C.C.A. Scheme of Education was launched in 1930. It may therefore be asked, Why suggest any alteration? The answer is that, whereas a knowledge of these subjects was then considered necessary in addition to the Gas Salesman's Course for those wishing to have a certificate to show they had qualifications as salesmen, there are many others to whom this information would be useful and who would welcome the opportunity of obtaining it. As to how it can be done, there would not appear to be any difficulty, if the scheme appealed to a sufficient number of undertakings, in Lecture Notes being prepared by competent authorities for the use of the lecturers appointed at each centre and where necessary; and where lantern slides would be helpful they might be available for hire. Arrangements for the classes would be the duty of the gas undertakings either singly, or grouped where the numbers available for instruction are small, and it is suggested that the most suitable places for the instruction to be given are the local Technical Colleges. Apart from the advantages of linking the scheme up with the Education Authorities, the surroundings are more suitable than the offices or lecture rooms of a gas undertaking. One difficulty which might occur would be to provide sufficient numbers each year to make the classes continuous, but if the lectures were sufficiently interesting and the cooking, heating, or lighting apparatus shown and explained were varied from year to year, there would not appear any reason why some of the employees should not attend more than one year of the same course. This would apply specially to the gas fitters and those to whom the instruction in these details was most necessary.

The recruitment of those employed in the office and on the Sales and Gas Fitting Staff is another interesting point on which views might be expressed; and also the facilities given to those who are attending educational courses, for while some undertakings are accused of being very unsympathetic in the matter of helping to defray the cost to the student, there appear to be others who go to the other extreme. In these days of reasonable remuneration, especially to the juniors employed, it does not always appear to be helpful to make education too easy for them, and there is a danger that those responsible for encouraging the training are too easily satisfied that, having dealt generously with regard to fees and expenses, they have fulfilled their duty creditably. It would be infinitely more helpful if those responsible would make themselves more conversant with the difficulties that have to be faced by the student in deciding what classes are suitable, and find out from time to time whether students are benefiting as they should from the classes, and whether the classes themselves are of the proper character. It is so much easier to leave such details to "somebody else," but the student and the Industry suffer accordingly.

The provision of the Course in Domestic Gas Salesmanship should also be discussed. By its nature, it is somewhat costly, and most of those who have taken it appear to have been nominated by their gas undertakings, who have acted most generously towards the salesmen who have participated. Much of the success of such a course of study will depend on the personality of those conducting the discussion groups, and this again is another example of how it is not sufficient merely to meet the expense of providing the opportunity. It would not be surprising to hear widely different opinions as to the value obtained by different undertakings. It is, nevertheless, desirable that opinions should be expressed, as it is only by ventures such as this that progress will be made. The fact that nearly 2,000 have gone through the course should be able to furnish some useful data for future guidance. Recently there has been available a Course of Lectures for Gas Fitters and Maintenance Staff, and it is suggested that views on the benefit to be obtained by this means would also be interesting and helpful.

To summarize, the object of the paper is to give an opportunity for full discussion on the education of those employees not already provided for by the Institution of Gas Engineers' Education Scheme. Facilities already provided by the British Commercial Gas Association are mentioned, but it is suggested that an extension of the field of education would be of considerable value to the Gas Industry. Those engaged on the clerical staff, meter readers, gas fitters, and maintenance men would all benefit by lectures and demonstrations of the apparatus in use and being fixed by the undertaking. So that those interested may have available in handy form particulars of the educational facilities already available, these are given in Parts III. and IV. after a short historical note in Part II.

Part II.

HISTORICAL.

Examinations in Gas Manufacture were held by the Royal Society of Arts as early as 1873, and when the City and Guilds of London Institute took over the technological examinations in 1879, the subject of Gas Manufacture was retained. In 1908, the syllabus having been revised, the examination was divided into Gas Engineering and Gas Supply, and in 1914 the subject of Gas Fitting was added. In 1918 a move was made by the Junior Gas Associations for a revision of the scope of the examinations; and following a discussion opened by Prof. A. Smithells at the Annual Meeting of the Institution of Gas Engineers on "The Education of the Gas Engineer" in May, 1919, a Committee was appointed to consider a revision of methods of education and examination in the Industry. After prolonged consideration and full discussion in all districts a "Scheme for the education and certification of those engaged in the technical work of the Gas Industry" was adopted at a special meeting of the Institution in February, 1923.

The scheme inaugurated Group Courses in Mathematics, Physics, Chemistry, and Engineering, along with Gas Engineering and Gas Supply; and by arrangement with the Board of Education courses were approved at several Technical Colleges for Internal Students. Recognizing, however, that on account of the geographical distribution of potential students it would not be possible in all cases for students to avail themselves of the opportunity of attending these centres, provision was made for External Students; and subsequent modifications have made it possible for students, even in isolated districts, to obtain certificates of equal value. Certificates are provided for three Grades—Ordinary, Higher, and Diploma.

Two years later (1925) arrangements were made with the City and Guilds of London Institute to eliminate overlapping by the establishment of Minor Group Courses in Gas-Works Practice and Gas Supply Practice and making Gas Fitting definitely a Craftsman's Course.

These Minor Group Courses are intended for those in the Industry who are anxious to improve their technical knowledge, but who, through lack of suitable educational opportunities or attainments or other causes, are unable to avail themselves of the Major Group Courses already mentioned. Gas Fitting is now a Craftsman's Course of the theory and practice of Gas Fitting and elementary science; and provision is made for students who desire to do so to pass from Gas Supply Practice and Gas Fitting to the Major Courses in Gas Supply, credit being given for certificates gained in the ancillary subjects.

It had been hoped when devising the scheme for Technical Education to provide one for those engaged in the Commercial Service of the Industry also, but to avoid delay this was deferred. It was not until 1930 that a scheme was inaugurated by the British Commercial Gas Association for the education of those engaged on the Sales and Service sides of the Industry. This consisted of instruction in Domestic Gas Salesmanship, with certificates of various grades according to the other qualifications of the candidates.

Part III.

INSTITUTION OF GAS ENGINEERS SCHEME OF TECHNICAL EDUCATION.

In the following description an attempt has been made to present the regulations governing the Education Scheme in a simple form. The subject has been approached from the point of view of the potential student and his chief, so that each may gather sufficient information for his initial purpose of deciding what courses are most suitable for any particular case. The student will be able to learn how certificates already acquired affect the course and the extent of his further studies, and provide his chief with a general knowledge of the scheme without the details of the regulations.

The regulations are administered by a Gas Education Committee which is responsible to the Council of the Institution of Gas Engineers, and acts in co-operation with the

Board of Education for England and Wales, the Scottish Education Department, the Ministry of Education for Northern Ireland, the Department of Education for the Irish Free State, and the City and Guilds of London Institute.

It provides for:—

Major Courses of a professional character with Examinations for Certificates, some of which are part of the normal requirements for Corporate Membership of the Institution of Gas Engineers.

Minor Courses of a non-professional character.

A Craftsman's Course.

Major Courses.

Internal Students.

Major Courses are provided in Gas Engineering and Gas Supply, in each of which there is an Ordinary Grade and a Higher Grade. Diplomas are awarded in Gas Engineering (Manufacture) and Gas Engineering (Supply). It is to be noted that, although the examination papers in the main subjects of Gas Engineering and Gas Supply of the Higher Grade and in both Diplomas are set by the Board of Examiners of the Institution of Gas Engineers, the scheme is one of education, and not simply of examination. Gas Engineering necessitates chemical, mechanical, and civil engineering knowledge, and Group Courses covering these subjects have been arranged at Technical Colleges at many centres. Courses in Gas Supply cover a somewhat wider range of the fundamental sciences of a lower final standard than that of subjects ancillary to Gas Engineering, and arrangements have been made for these also at Technical Colleges. A list of centres for both groups is given in Appendix I. It is only possible usually for Technical Colleges to provide instruction in separate classes in the two main subjects, Gas Engineering and Gas Supply. For instruction in ancillary subjects, students attend classes arranged primarily for those engaged in other industries and occupations, and if the number of students is small, it may not be possible to have classes in the main subject every year; but reasonable modifications of the courses overcome any slight inconvenience so caused.

For those entering the profession who have received a full time education up to the age of 16, or who have passed with credit a junior or preliminary Technical Course such as is provided in Continuation Schools, and who are within the reach of a Technical College with an Approved Course, the procedure is a simple one. They enter as Internal Students for the three or five years' course, taking the Ordinary Certificate at the end of the third year and the Higher Certificate two years later.

Where a higher degree of education has been attained, exemption from corresponding subjects to those already studied can be obtained. For instance, School Certificates A and B and Matriculation exempt from the first year's study in the Ordinary Grades in the corresponding subjects in which the pass was obtained, while holders of the National Certificate in Chemistry or Engineering are exempted from the Chemical or Engineering subjects, and where the student can produce evidence in the form of a certificate of any recognized examining body or school or college approved by the Education Authorities, of satisfactory tuition and examination to an equivalent standard in subjects included in the Course, he can obtain exemption from them. Engineering institutions holding entrance examinations are considered for this purpose as recognized examining bodies. Exemptions of part or the whole of a subject or subjects of a Course give equivalent exemptions of the hours of attendance at classes, except that all conditions (including attendance) must be fulfilled in the final year of the Course. If, therefore, a subject from which exemption is obtained is included in the Final Year, an equivalent amount of study of a different subject relevant to the main subject of Gas Engineering or Gas Supply must be substituted with the previous sanction of the Gas Education Committee.

It is interesting to note that an increasing number of University graduates are entering the profession, who desire to pass the Higher Grade Examinations as qualification for Corporate Membership of the Institution. According to the subjects covered by their degree, these usually obtain exemption from the ancillary subjects of the Ordinary Grade. In all cases application for exemption for Internal Students must be made by the Principal of the Technical College.

It is desirable that a student should study both Chemical and Engineering subjects in both grades of the Course; but how far this is possible depends on the classes available at the Technical College, and therefore latitude has to be allowed to them when submitting courses for approval. In the recent revision of the regulations just published, specimen courses are given which are now generally found available and which are very suitable. As showing the readiness of the Colleges to provide what is wanted, it is gratifying to find that many of those which had courses approved in the earlier years of the Scheme, and which were not so suitable, have made application to have their courses revised. These Specimen Courses are given in Appendix II.

External Students.

A means whereby anyone employed in the Gas Industry, wherever his place of residence relative to Technical Colleges where instruction is provided or the nature and requirements of his employment, should be able to participate in the scheme of education and examination was provided in the original scheme, and in the early days proved the cause for much discussion and alleged grievance on the part of the potential students. A reasonable exercise of patience and a willingness by the Education Committee to understand the arguments put forward resulted in considerable improvement on the original functioning of this provision for the examinations to be taken externally. The Education Committee was rightly anxious that the scheme should be one of education and examination, and not one of examination only, as the Certificates gained by the External Student had to be of equal value to that of the Internal Student. The geographical distribution of the potential students and their varied requirements, and the fact that the Gas Industry, unlike many other industries, is not concentrated in special districts, and consequently there would only be a small number of students in many districts, gave rise to much discussion as to the best means of meeting the difficulty. Eventually it was decided to make the best use of existing educational facilities in Technical Colleges, and to arrange for the examination in the ancillary subjects to be conducted by recognized examining bodies such as the Union of Lancashire and Cheshire Institute, the Union of Educational Institutions, the East Midland Educational Union, &c. It has thus been possible to provide for students in all parts of England and Wales, Scotland, Northern Ireland, and the Irish Free State; and it is pleasing to be able to state that examinations have even been conducted in countries overseas. External Students are strongly advised in their own interests to attend classes at Colleges, and before commencing their studies to communicate with the District Gas Education Committee of their area who, being in close touch with the Education Authorities, are able to give information as to where suitable classes in the ancillary subjects are available and to use their influence to arrange for suitable tuition where classes of sufficiently high standard are not ordinarily available. In isolated areas, the the District Gas Education Committee may also be able to arrange by negotiation with the engineers of several undertakings for suitable classes to be held during the day at certain centres.

The following table gives the ancillary subjects which have to be passed by External Students along with the main subjects of Gas Engineering and Gas Supply.

Ancillary Subjects.	Gas Engineering.		Gas Supply.	
	Ordinary Grade.	Higher Grade.	Ordinary Grade.	Higher Grade.
Practical Mathematics	S 1	S 2	S 1	S 2
Engineering Science	S 1		S 2	*p
Mechanics		S 3		
Heat Engines		S 3		
Machine Drawing	S 2		S 2	
Inorganic Chemistry	S 3		S 1	S 2
Physics	S 1		S 1	S 2
Building Construction		S 1		S 1
Electrical Engineering				S 1

[The symbols S 1, S 2, S 3 are used to denote the grade of a subject, and indicate respectively the examination taken at the end of one, two, or three years' study of the subject in a normal Senior Course at a Technical College. Equivalent terms sometimes used are Grade I., Grade II., Grade III., or T 3, T 4, T 5.]

As a further safeguard against qualification by examination only—*i.e.*, without proper instruction or knowledge of the various subjects—External Students in the Higher Grade who qualify in the written examinations are ex-

amined orally by the Board of Examiners, when knowledge of the relevant ancillary subjects and of the main subjects of Gas Engineering and Gas Supply are tested.

Diplomas.

In view of the nature of the Diploma Examinations, Technical Colleges do not provide Special Courses, and candidates must rely on University and College Courses, private study, practical work, and coaching. Candidates must have acquired educational qualifications of not lower standard than Matriculation, and have obtained a Higher Grade Certificate (First Class) in Gas Engineering and an Ordinary Grade (First Class) in Gas Supply when taking the Diploma in Gas Engineering (Manufacture); and a Higher Grade Certificate (First Class) in Gas Supply, Certificates in additional ancillary subjects, and an Ordinary Grade Certificate (First Classs) in Gas Engineering, or have received satisfactory instruction in an additional subject from a list given by the Gas Education Committee in their Regulations, when taking the Diploma in Gas Engineering (Supply). They must then submit an original Thesis on a subject approved by the Board of Examiners, sit for a written examination, and be orally examined. A candidate for either Diploma who has taken an approved degree in Gas Engineering in a British University is not required to take the written examination.

Minor Courses.

Minor Courses are provided in Gas-Works Practice and Gas Supply Practice. Each course extends over three years with one examination by the City and Guilds of London Institute. The former affords opportunity for those who do not desire to qualify for professional status but wish to learn more of the processes of the Industry in which they are daily engaged. The same might also be said of the latter, but experience has shown that students attending it often desire to proceed to the Major Course of Gas Supply, and where numbers requiring tuition are small, Technical Colleges are encouraged to start classes in the Minor Course in the hope that a demand for the Major Course will eventuate. In addition to the main subjects, a knowledge of Mathematics, Drawing, Physics, and Chemistry is required, and the course usually approved for the ancillary subjects is that of the first two years of the Ordinary Grade of Gas Supply spread over three years. Where Courses in Technical Colleges have been approved, the Internal Candidates are examined in the main subjects of Gas-Works Practice and Gas Supply Practice by the City and Guilds of London Institute, and by the College in ancillary subjects. Students in districts where courses are not available are examined as External Candidates.

Craftsman's Course in Gas Fitting.

Gas Fitting is a Craftsman's Course, and provides for the training of gas fitters. It extends over five years, and is divided into three Grades, viz., Grade I.—extending over one year; Grade II.—extending over two years; Final Grade—extending over two years. An examination, for which a Certificate is awarded by the City and Guilds of London Institute, is held at the end of each Grade of the Course. In Grade I. the examination consists of a written paper only. In Grade II. and Final Grade each examination consists of a written paper, a practical examination, and an oral examination. It is available for lads of 16 years of age and upwards, and instruction is given in the technology and practice of Gas Fitting and the utilization of gas. The student thus normally obtains his certificate in the Final Grade from the City and Guilds of London Institute at about the age of 21, and later, on receipt of a letter from his employer stating that he has carried out gas-fitting work on the district for two years of a more responsible character than that involved in acting solely as Gas Fitter's Mate, the certificate is exchanged for one endorsed by the Institution.

Students residing in districts where a Course in Gas Fitting is not available may be examined as External Candidates. The Final Grade Certificate does not exempt the holder from any part of the courses in Gas Supply or Gas Supply Practice, but if, during the Course, a student passes examinations in Mathematics, Physics, Chemistry, Engineering Science, or Machine Drawing, he can obtain exemption in respect of these subjects in preparing for the Ordinary Grade of Gas Supply or Gas Supply Practice.

Part IV.

BRITISH COMMERCIAL GAS ASSOCIATION SCHEME FOR GAS SALESMANSHIP.

The Scheme is administered by a Gas Commercial Education Committee responsible to the Association, and awards three different certificates and a Diploma, namely:

(1) *A Gas Salesman's Course Certificate* awarded to students who have passed in Domestic Gas Salesmanship.

(2) *A Gas Salesman's Technical Commercial Certificate* awarded to students who in addition to passing in Domestic Gas Salesmanship and Economics of Gas Supply have obtained a Certificate in the Institution of Gas Engineers' Ordinary Grade Gas Supply or Gas Supply Practice, or the Final Grade in Gas Fitting, or under certain conditions the City and Guilds of London Institute Ordinary Grade in Gas Supply.

(3) *A Gas Salesman's Advanced Technical Commercial Certificate* awarded to students who, in addition to passing in Domestic Gas Salesmanship and Economics of Gas Supply, have obtained a Certificate in the Institution of Gas Engineers' Higher Grade Gas Supply, or under certain conditions the City and Guilds of London Institute Honours Grade Gas Supply.

(4) *A Gas Salesman's Diploma* awarded to students who hold a Gas Salesman's Advanced Technical Commercial Certificate, and submit (1) a suitable thesis on some aspect of Gas Salesmanship, and (2) evidence of work done in the development of Gas Sales, and (3) pass an oral examination.

Domestic Gas Salesmanship Course.

The Domestic Gas Salesmanship Course was introduced in 1930, the Association recognizing that, valuable as were the scheme for Technical Education of the Institution of Gas Engineers and the organization by themselves of Salesmen's Circles for the discussion of selling problems, neither of them provided a means of training in Salesmanship. The Course is embodied in seven handbooks which are issued to students at intervals of approximately one month, and cover the following subjects:

1. Selling from the Customer's Viewpoint.
2. Guiding the Selection.
3. Convincing the Customer of Value.
4. Selling More Gas.
5. Overcoming Difficulties.
6. Reaching the Larger Market.
7. A seventh handbook is also issued with the Course which deals with Gas Sales Technology to the extent of embodying the minimum of Technical information with which a Gas Sales representative should be equipped in order properly to carry out his work.

Where possible, Discussion Groups are arranged, and Manuals are issued for the conduct of group meetings for discussion and demonstrations arising out of the subject matter of each handbook.

Each volume concludes with a problem or problems (involving a number of questions) to be solved by the student, and his answers are corrected, graded, and carefully criticized for his help and future guidance. Certificates are awarded by the Association, and the handbooks constitute valuable works of reference and guidance.

While the preparation for the examinations in the foregoing provide for the particular requirements of the Gas Industry, it is recognized that a good general education is necessary to equip the Salesman with those qualifications which make for success. Classes or Lectures in English Literature, Economics, History, and the Arts are obtainable in every area, and instruction in Elocution, a matter of great importance to the salesman, is also available in many districts. These subjects, studied in attaining such a general education, will vary, and it is for the individual student to take this matter in hand for himself with any guidance he may obtain from his employer or educational adviser. So that his achievements may be recorded for his benefit and the information of his employer, they are endorsed, at the student's request, on the various certificates.

Lectures to Gas Fitters and Maintenance Staff.

With the object of providing the means of developing among Distribution men a proper realization of their opportunities in influencing consumers with whom they are brought daily into personal contact, a Course of Six

Lectures has been prepared. They are in a form acceptable to the type of trainee for whom they are intended, and, while following a definite plan, are sufficiently fluid in character to admit of adaptation to the policies and requirements of individual undertakings, or the problems of individual localities.

These lectures are delivered in each locality by experienced lecturers. The duration of the talks is about 45 minutes, and each address is followed by a period for questions and discussion.

Though the subject matter is practical, it does not deal with technical questions as such, but concentrates attention upon the methods of carrying out technical duties in such a way as to ensure the consumers' satisfaction and goodwill.

The titles of the lectures are:

1. Service and its Effect on Sales.
2. Installation that Makes Satisfied Consumers.
3. Maintenance and Inspection from the Consumer's Viewpoint.
4. Relations with the Consumer.
5. The Right Use of Opportunity.
6. Co-operation for Still Greater Success.

APPENDIX I.

THE INSTITUTION OF GAS ENGINEERS.

List of Centres having approved Major Courses in Gas Subjects.

Bath	Leeds
Barnsley	Leicester
Birmingham	Liverpool
Blackburn	London—
Blackpool	Sir John Cass Institute
Bournemouth	East Ham Technical College
Bradford	Regent Street Polytechnic
Bristol	Poplar
Burnley	S.E. London Technical Institute
Cardiff	Westminster Technical Institute
Derby	Luton
Dewsbury	Manchester
Dublin	Newcastle-upon-Tyne
Dudley	Plymouth
Dundee	Salford
Edinburgh	Sheffield
Glasgow	Southampton
Halifax	Stockport
Huddersfield	Stoke-on-Trent
Hull	Wigan
Kirkcaldy	Wolverhampton
	Wrexham

APPENDIX II.

SPECIMEN GAS ENGINEERING COURSE.

ORDINARY GRADE.

1st Year—	
Practical Mathematics	S 1
Physics	S 1
Inorganic Chemistry (Theoretical and Practical)	S 1
2nd Year—	
Engineering Science	S 1
Inorganic Chemistry (Theoretical and Practical)	S 2
Machine Drawing	S 1
3rd Year—	
Inorganic Chemistry or Physical Chemistry	S 3
Machine Drawing	S 2
Gas Engineering (Ordinary Grade).	

HIGHER GRADE.

4th Year—	
Building Construction	S 1
Engineering Science	S 2
Practical Mathematics	S 2
5th Year—	
Heat Engines	S 3
Applied Mechanics	S 3
Gas Engineering (Higher Grade).	

[See note on symbols in next column.]

SPECIMEN GAS SUPPLY COURSE.

ORDINARY GRADE.

1st Year—	
Practical Mathematics	S 1
Physics	S 1
Machine Drawing	S 1
2nd Year—	
Engineering Science	S 1
Inorganic Chemistry	S 1
Gas Supply (Minor Course Standard).	
3rd Year—	
Machine Drawing	S 2
Engineering Science	S 2
Gas Supply (Ordinary Grade).	

HIGHER GRADE.

4th Year—	
Practical Mathematics	S 2
Building Construction	S 1
Electrical Engineering	S 1
5th Year—	
Physics	S 2
Inorganic Chemistry	S 2
Gas Supply (Higher Grade).	

[The symbols S 1, S 2, and S 3 are used to denote the grade of the subject and indicate respectively the examination taken at the end of one, two, or three years' study of the subject in the normal Senior Course of a Technical College. Equivalent terms sometimes used are Grade I., Grade II., Grade III., or T 3, T 4, T 5.]

Discussion.

Mr. W. J. SANDEMAN (General Manager, Croydon Gas Company): It gives me very great pleasure to propose a vote of thanks to Mr. Terrace for his very useful paper. As he has confined his remarks more or less to the training of those engaged on the commercial side of our Industry, I do not propose to make any reference to the engineering side, which is, I think, very much better provided for. The recruitment of staff for the commercial side of the business is a vitally important matter. While this does not demand such a wide technical training, it nevertheless demands a good primary knowledge of chemistry, physics, and mathematics, which play an ever-important part in utilization problems. Both the B.C.G.A. Gas Salesmen's Course and the I.G.E. Gas Supply Course fulfil useful purposes, but I do not think that of themselves they provide an adequate basis for training. The former takes no account of personality—a vitally important factor in a salesman—and the latter, while embracing the underlying scientific studies, is not sufficiently practical. I mention this because I consider it unfair to judge the capabilities of a student merely by the results of written examinations.

We have tried to some extent to overcome this difficulty, and I think I might comply with Mr. Terrace's request and give you a few particulars of the methods we have adopted. To take the showroom staff first, we have found from experience that this can best be recruited from the general office staff, because knowledge of routine and commercial procedure is a fundamental necessity. Young men in the early twenties, who have attended the local Polytechnic, in Gas Supply classes, and who have the right manner and appearance, are given six months' practical experience in the workshops in the elements of fitting and repair work, appliance design and construction. They then have a short time on the district with the district inspector. Periodically they attend the shops for refresher courses to keep them "live." From time to time they are taken out of the showrooms and put on to special selling work on the district. Lectures and education talks are given and circles of study, debate, &c., are arranged for them.

For many years we have had a six years' training scheme for gas fitters, which works extremely well. Boys from the elementary schools, starting at 14 to 15 years of age, go through a six months' training in the workshops and are then transferred to the district to work as fitters' mates. Six months before the completion of their training they go back to the shops for a refresher course before they are put on to the district as fully qualified fitters. During the first five years of their training they attend evening classes at the local Polytechnic, in mathematics, carpentry, chemistry, physics, gas supply, and technical drawing, and they take the City and Guilds of London examination in Gas Supply, minor course. Some follow this up by taking the more advanced course of the I.G.E. at the Westminster Technical Institute.

I should like to make it clear that, while attendance at the classes is compulsory, the students are not compelled to sit for the examination. As a matter of fact, I always prefer to rely on individual reports from the teachers as to the ability of the students. Distribution and sales pupils are taken under a deed of pupilship for five years. They must have matriculated and are required to enter for the I.G.E. Ordinary and Higher Grade of Gas Supply. They are given commercial and practical training in all sections—main laying, fitting, stores work, stoves repairs, office procedure, showrooms, &c.—with a view to turning them out fully equipped to take charge of a district, either as a district inspector or as a superintendent.

Qualified Instruction.

For the purpose of training recruits in all sections, a qualified instructor is attached to our workshop. He has a demonstration workshop in which all types of apparatus are fixed for instructional purposes. Opportunity is taken from time to time to send recruits to manufacturers' works to widen their knowledge, and they are encouraged to join the Junior Gas Association. We arrange talks to fitters, and depôt meetings in the spring and autumn, and there are two general Sales Conferences held annually. Each winter, series of lectures are given, while the showroom staff combine together to form a circle of study and debate.

The suggestion by Mr. Terrace that all employees should be given an opportunity to visit works—and I would also like to include the stove repair and general repair shops—is an excellent one, because the more the staff can be educated the greater does their interest become in the company's business. It is perfectly true that in many undertakings large numbers of the indoor staffs have not the slightest notion of how gas is manufactured or distributed. We maintain a very close association

with our local Polytechnic. Classes, many of which are conducted by our own officials, are specially arranged to suit our students, and the special duty of one of the Company's officers is to advise students as to the most suitable course to be taken to assist them in their particular type of work.

Necessity for Education.

Mr. A. J. GARWARD (Sales Manager and District Superintendent, Portsmouth Gas Company): It is an honour for a salesman to be called upon to second the vote of thanks to Mr. Terrace. In the first place, I am confident that everybody in the room will agree as to the necessity for education to-day, especially on the sales side. It is essential that not only the sales staff, but also the office staff and the gasfitters should be trained. Every man who comes into contact with the consumer should, I suggest, have some knowledge of salesmanship. Mr. Terrace has asked for our constructive criticism on the present Gas Salesmen's Course. In Portsmouth 58 members of our staff went through the Course, and I have gone to a considerable amount of trouble to get from them their opinions as to the Course itself. I have also taken care to keep a record of their results, in order to see whether there is any great improvement. I can say that there has been a considerable improvement due to the Course, and therefore I do recommend every undertaking, if it has not done so already, to consider the training of its staffs or the encouragement of the staffs to take this Course.

I think the bulk of us will agree with Mr. Terrace that the Course in domestic gas salesmanship is somewhat costly, and I suggest that if the cost can be reduced it would result in a considerable increase of the number of students. Undoubtedly, the Course, for the beginner, is of great importance, as it does teach him the handling of the prospective customer and helps him materially in selling and avoiding the mistakes which beginners are apt to make. On the other hand, I do suggest that the Course as it is at present appears to make selling too easy. The imaginary customers are all too affable and the many really difficult and tiresome ones are not catered for. [Laughter.] In the fortnightly test papers—or "sales cases" I think they are called in the book—too many questions require just a "Yes" or a "No." A good salesman of many years' experience, if given an opportunity to enlarge upon the subject in question, could have discussed the matter at some length and to better advantage. In some instances, salesmen of proved ability and years of practice answered "No" and they lost marks. Yet, from their years of experience, "No" was the correct answer. Therefore, we have formed the opinion that the class is practically of no use to a man who has spent many years at selling. He is asked to change his methods, which have proved successful. The practice sales at the group meetings of the students, which we held in our showrooms to try to get the correct atmosphere, were not very helpful. I am sure everybody will agree that it is very difficult for a member of the staff correctly to impersonate a customer, and the whole atmosphere was entirely different from that which would arise when dealing with an actual consumer.

Another difficulty is that, now that the first wave of enthusiasm is over, and the Course is passed, it is difficult to get further students. There were 58 members of our staff who undertook the Course, and I am glad to say that everyone of them passed; but the lower members, because their positions were not advanced, felt perhaps a little resentment. Of course, you may say, and perhaps there is some truth in it, that it was my fault for having allowed certain members of the staff, whom we had no idea of advancing, to undertake the Course. But I do feel that it is essential for every member, and it will be realized that it is not possible to advance every member of the staff upon passing the Course. The difficulty is, therefore, that those who have not been advanced will not go further with the Course.

I was very interested to hear Mr. Sandeman's remarks on what is done in Croydon to educate the fitters. We work on lines somewhat similar to his. We have monthly or bi-monthly lectures to the whole of the fitters and maintenance staffs, and we find that these are very satisfactory and very helpful to the men. It is doubtful whether, unless the cost is considerably less, it would really pay us to support the gas fitters' lectures. We have a gasfitters' training scheme in Portsmouth, by which apprentices, at the end of their fourth year, have to pass examinations again, and the questions include sales problems besides the practical ones. Therefore, our fitters are given a certain amount of elementary salesmanship training during their early years.

Birmingham's Practice.

Councillor R. H. HUME, M.A. (Chairman, Birmingham Gas Department): I stand here to explain to you what we do in Birmingham. Our motto is "forward." Years ago, when Dr. E. W. Smith was with us, classes were begun and lectures were given by leaders in the various departments. About five years ago this question of education arose again in Birmingham; I was Chairman of the Education Committee at the time and we catered not only for the Gas Committee but for all departments in the municipality. We came to the conclusion that help should be given to those who wished to improve themselves. When a diploma or a degree at a university is being sought, we give a help after the student has made an effort. Of course, the question of books is a very serious one, especially on the technical side, and after the intermediate examination we give a grant of £10. When the diploma is obtained we make the total grant £25, and in the case of a university degree it is £35. The result is that practically everybody on our staff in Birmingham is doing something, and only on Monday, at our monthly meeting, I had the pleasure of congratulating two of our engineering staff who had taken the B.Sc. degree of London.

The gasfitters' and every other section now is catered for, and arrangements are made with the Principal of the Central Technical School in Birmingham. I had only to dot the "i's" and stroke the "t's" in respect of what was done in the Gas Department, because we have had the advantage of the help of Mr. Rogers—I am sorry from our point of view that he has now left us, but from his own point of view I congratulate him—and of Mr. Lewis and Mr. Marsh; they arranged a complete scheme, which was put into working order.

It has been stated by Mr. Sandeman that he obtains boys from the elementary schools. But there has been a great increase of secondary pupils during the last 15 years; the number of secondary pupils in Birmingham has increased by from 50 to 60% during the last 15 years, and inasmuch as there are so many young people going through the secondary schools, I have always preached the doctrine in Birmingham that it is entirely foolish for everyone having a secondary school education to join the black-coated brigade. I am of opinion that a first-class craftsman or engineer is a far better asset than a clerk, and the result is that even in our fitting department we have not the slightest difficulty in getting a good supply of boys from the secondary schools; indeed, practically all of them come from those schools.

As an academic man myself, I was interested to hear that Mr. Sandeman does not stress examinations too much, but stresses personality. We in Birmingham are at great pains to find out the personalities of the boys before they venture upon their training—and we do not have many throwouts in Birmingham. All our gasfitters attend lectures compulsorily, and quite a number go further and take the minor course or even the major course. We have one plumber who is going forward for his gas engineering certificate, and is likely to do very well. In addition to the compulsory classes we have voluntary classes on practical subjects. Last year we borrowed the services of Mr. Whitehead, of Bournemouth, and at each of the two lectures which he gave on practical work, no less than 300 turned out to hear what he had to say. So that there is a good spirit in all our workmen. When young fitters have gone through their courses and completed them satisfactorily we provide prizes, we have them into the Committee room and congratulate them and get to know them individually; the moment their courses are finished we give them 2s. per week above the standard rate of pay. That, I can assure you, is very acceptable to the young people. Altogether, I would encourage all undertakings which have no educational courses to start them at once, because the work is thoroughly well done.

Examinations No Criterion of Ability.

Mr. J. H. CLEGG (Engineer and Manager, Southport Corporation Gas Department): I agree that the result of an examination is not a criterion of the ability of a man to fill a certain position; we all know that other qualifications are required—head and heart, initiative, energy, and so on. But, at the same time, the result of an examination is the only guarantee that a man has taken a particular course. Whether he has obtained a first or second class certificate, or a distinction, may not be so important, but the fact that he has taken a course is important. I may be pardoned for mentioning the Institution of Gas Engineers examinations. My experience of the results of some of those examinations, and my knowledge of the candidates, has led me to believe that many anomalies arise in the award of honours and the results of examination. At the same time, in considering the claims of an applicant for a position, I think we should all regard very seriously the fact that he had taken the examination after the Institution course, whatever he obtained as a result—whether it be a first or a second class certificate.

Col. W. M. CARR, O.B.E., T.D. (Engineer and General Manager, Stretford and District Gas Board): I should like to deal with one point raised by Mr. Terrace with regard to general training. I personally have found that compulsory classes of any description are practically useless, even compulsory classes held in the undertaking's time are practically useless, because in a community of workers in an undertaking you have always a percentage who are content with the particular line on which they are working. Such men might be fitters, or they might be clerks, but their attitude is "This is my job; why should I bother? I know enough to be able to do the particular job I have been given to do, and why should I bother to acquire a knowledge of other departments?" Therefore, I think it is necessary for us, in respect of our classes, to make our selections originally. That brings me back to the point raised by the Chairman of the Birmingham Gas Committee with regard to the selection of our workers at the outset; and I do think it is important that when we are starting junior employees we should make most careful inquiries as to their education. At Stretford we are in touch with the technical school; even when taking on a junior apprentice fitter we obtain a full report of what he has done at school, and of his general character, and we obtain all the information we can about him from the school. We do feel, then, that in respect of trainees we are starting on a proper basis, and I cannot stress too much the importance and desirability of that preliminary investigation before starting a junior, even if he is only a junior fitter, because, after all, I think that possibly the best salesman on my staff to-day is a man who

started in that way as a junior some 11 years ago. He had personality, keenness, and the desire to advance.

With regard to training—and I speak of training as part of education—the policy of practically every undertaking in the country, I think, is to send young fitters out as boy mates to older fitters. I always feel that one might be sending a trainee out with a man whose work is not all that one might desire, whose methods were learned perhaps a generation ago from somebody whose practice was again not so good as one might have desired. The tendency of that system is to pass on the faults of the older worker to the younger. I was impressed, however, by the method of training fitters in America. The people there avoid the attachment of their junior workers, for training purposes, to older workers who may not be as skilled or experienced as desirable. They start the young men in a school. There they teach them first of all the principles of gas manufacture, which I think is essential, so that they know the product they are handling, how it is made, and what its potentialities are. Then these young men are trained in standard methods of fitting as adopted by the particular undertaking—almost all the undertakings have these standard methods—and a further period is devoted to the location of faults, and so on. In some of the larger American undertakings, no fitter goes on to the district until he has spent some 18 months of practical training under the most skilled instructors that can be found. I know that that may be regarded as an ideal for us to try to achieve in this country, but I put it forward as representing a line of thought worth consideration. I am not at all certain that the adoption of such a scheme would not pay well even in our largest undertaking. I am aware that it would increase the costs materially, but the extra cost would be amply repaid by reason of having better trained personnel available (say) a generation hence.

A Tribute to Mr. Terrace's Work.

Sir FRANCIS GOODENOUGH, C.B.E.: I should like to say to Mr. Terrace that we will certainly refer the suggestions he makes to the careful consideration of the Commercial Education Committee of the Association. I am sure there are many suggestions which we should be wise to give careful attention. I should like personally to thank Mr. Terrace for preparing this interesting summary, and to pay a tribute to him, as Deputy-Chairman of the Gas Education Committee of the Institution, for his devoted work in the advance of education since bad health forced him to give up work in other directions.

The vote of thanks was accorded with acclamation.

Mr. TERRACE, replying, said: On the whole, I think the criticism of the B.C.G.A. scheme in its present form is very satisfactory; that more than 2,000 could take advantage of it was no mean achievement. I have tried to suggest that views may vary with regard to it. Each one of us measures things according to his own yard measure, but I am sure that nothing but good can result from the statements by the members here as to what they are doing in their individual undertakings.

Annual Dinner of the B.C.G.A.

A company numbering nearly 500 assembled at the Cutlers' Hall, Sheffield, on the evening of Tuesday, Sept. 25, and were entertained at dinner by the Chairman and Directors of the Sheffield Gas Company. Lieut.-Col. H. K. STEPHENSON, D.S.O., D.L., LL.D., J.P. (the President of the Association), presided in his capacity as Chairman of the Company.

The guests whom he and his co-Directors entertained included the Lord Mayor of Sheffield (Alderman Fred Marshall, J.P.), the Master Cutler (Mr. Chas. J. Walsh), and many others who are concerned with the industrial and civic life of Sheffield and district, as well as the members of the Association.

A circumstance which was a subject for great regret was that Sir Robert Hadfield, Bart., who is a Director of the Sheffield Gas Company and was President of the Association when it last held its conference in Sheffield, in 1920, was unable to be present. He made an offer, through the Chairman, of a prize of ten guineas for a paper on the value of the use of gas for industrial purposes—an offer which, of course, was gratefully accepted.

Mr. C. VALON BENNETT (President of the Institution of Gas Engineers) proposed "The City and Trade of Sheffield." He said: You are the possessors of an undertaking providing energy and light in the form of electricity, and I am sure you are proud of it; but I am equally certain that you are just as proud of the gas undertaking, which you do not own, but which, I am sure you will agree, is vital to your city and the other areas it serves. In these days of continuous processes you must envy the reliability and cheapness of the Gas Company's supplies.

The trades carried on in Sheffield are legion, but, of course, the heavy steel, cutlery, and lighter metal goods trades are the most important. Sheffield, like most other cities, has suffered a period of trade depression. But what has been the result? The producers of goods did not sit down and wait for better times, but saw to it that better times were with them, before many other industries. One of the reasons why trade has recovered is that you have made certain that, if there were any processes by which you could produce better and cheaper goods, you would employ them. I am sure you will agree that the Sheffield Gas Company have done noble and pioneer work which has assisted trade recovery, for they have been able to prove that gas is the most satisfactory fuel for the treatment of metals where continuous and exact temperature control is essential. Manufacturers, realizing the necessity for exactness, cleanliness, efficiency, and economy, are so convinced that gas is the ideal fuel that more than one half of the gas sold by the Company is used for industrial purposes. I congratulate the coke-oven gas producers and the Gas Company upon having agreed upon terms which are mutually beneficial in connection with the gas produced at the coke-ovens, thus permitting gas to be distributed at low prices. The part that steel plays in modern buildings is astounding; and I assure you that the Gas Industry believes in Britain for the British, and uses British steel only, in its engineering, manufacturing and distribution departments.

And now, my Lord Mayor and Master Cutler, I would impress upon you that we who have travelled from the four corners of the Kingdom to visit Sheffield do appreciate the hospitality you have shown us; we are grateful for all you have done to make our conference happy and comfortable. Knowing how well you wish us, we reciprocate to the same extent. Thus, if wishes come true, it will mean great happiness and prosperity to the City and trades of Sheffield, which toast I ask everyone present to drink most heartily; and I couple it with the names of the Lord Mayor and the Master Cutler.

The LORD MAYOR OF SHEFFIELD (Alderman Fred Marshall, J.P.), responding, said: I should like to thank you very heartily for your kind hospitality this evening; and I should like also to thank Mr. Valon Bennett for the very felicitous way he has proposed the toast to the City and trade of Sheffield.

Sheffield to-day, of course, is the first city in Yorkshire! Its manufactures are known in the four corners of the earth; it has established fame for steel and allied products second to none in the world. Mr. Valon Bennett is right when he talks of the excellence of the tool steels of Sheffield. I think we may say that, with reasonably free international trade, many of the difficulties that now beset us will be removed and Sheffield will once more experience a period of prosperity. There has been an improvement in trade; at last there has been a very welcome decrease in unemployment and very welcome activity in our factories. We all rejoice in the improvement registered, and I thank you for the very whole-hearted way in which you have received the toast.

The MASTER CUTLER (Mr. Chas. J. Walsh), who also responded, said: I should like to tell Mr. Valon Bennett that at the present time Sheffield is turning out a greater tonnage of steel than it ever has done in its history. [Applause.] There has been a noticeable tendency for various industries which are feeling the full effects of the constantly changing conditions to rely too much on the hope of Government assistance and subsidy. While I believe the Government is able to give very valuable encouragement and support to progressive industries by wise and scientifically arranged tariffs, I am convinced that, taking the long view, the responsibility for working out its own salvation rests with each individual industry. ["Hear, hear."]

I believe that in this respect the British Gas Industry is a conspicuous example, for, in spite of many handicaps, it has made enormous progress in providing cheap and efficient supplies, which have been of great benefit particularly to industrial users and a comfort and convenience in our home life. Sheffield has been well served in this respect, and it is no exaggeration to say that the supply of gas has played an important part in the rejuvenation of Sheffield's industries.

Sir SAMUEL ROBERTS, Bart, M.A., LL.B., M.P., J.P., proposing "The Gas Industry," said: During the period I have been connected with Westminster, the Gas Industry has come to Parliament on many occasions. It has come to Parliament to ask to be freed from antiquated restrictions which have blocked its business and prevented its extension, and it has also come for protection against what I may possibly call the Fascist efforts of certain electric supply departments. I have no doubt that the Gas Industry is not yet satisfied with all that Parliament has done; I have never known any industry satisfied with what Parliament has done! But I think I can assure you that at any rate the present House of Commons means to see that gas gets a square deal, and that it is sympathetic with the efforts of the Gas Industry in this country. [Applause.]

I can propose this toast very whole-heartedly, because some of the businesses with which I am connected are entirely dependent upon gas, or are very largely dependent on the Gas Industry, as their best customer. I think there is no industry in modern times which has caused such surprise to the ordinary man in the street. Thirty years ago a man would not have been considered an unreasonable pessimist if he had said that thirty years from that time the Gas Industry would be about as much use to this country as a tallow candle. How wrong the pessimist

has been—when we see to-day that this great industry is supplying its products to ten million of the houses in this country! That is a record which causes intense surprise. And I think one can say also with fairness that gas to-day is the best and cheapest fuel both for power and heating. [Hear, hear.]

All that has been done is due, I think, in the first place, to the inherent quality of gas itself, produced, in the main, from the great and valuable coal deposits of this country. But that alone would have been useless but for the man power which has been put into it—the brains of the inventor, and of the salesman and organizers—and I think a great debt of gratitude is due to those who have kept gas in the forefront of our industrial life.

I have the pleasure of coupling this toast with a name that is a household word in British industry—that of Sir David Milne-Watson. [Applause.] In this country we are fortunate above all things in having business men who are willing not only to look after their own businesses but to devote also some of their very best efforts to organizing industry as a whole. Sir David is one of these.

Sir DAVID MILNE-WATSON, D.L., LL.D. (President of the National Gas Council, and Governor of the Gas Light and Coke Company): It is with very great pleasure that I rise to respond to the toast of "The Gas Industry;" and I was delighted when I heard that it was to be proposed by Sir Samuel Roberts, for whom I have a very warm feeling of friendship. I was delighted also to note that he, as a Member of the House of Commons, is always prepared to give gas a square deal, and that he, at any rate, is converted to the view that the Gas Industry is no dying industry.

The Sheffield Gas Company provides an interesting example of the development of the Gas Industry. Under the very able Chairmanship of Col. Stephenson, and under the management of Mr. Halkett, that Company has moved from success to success and leaves no stone unturned in meeting modern requirements. Its history and its work are matters of interest, and almost of astonishment, to those of us in other parts of the country. Mr. Halkett told us to-day that he had no less than 14% increase in business this year.

But there is the reverse side to that picture, which I want to stress. The Gas Industry has to work very hard to achieve such increases. Those concerned in it have to make a great deal of sacrifice for the Industry.

I was very much interested, when I visited the Building Exhibition at Olympia last week, and saw the efforts that are being made at the present time by the gas undertakings and by the manufacturers of gas appliances to meet the new wants of the times. At the present moment large blocks of flats are being erected all over the country for occupation by middle-class inhabitants and for the working classes, and there I find, to my great pleasure, that not only are gas companies and municipal undertakings trying to meet the demand, but the makers of appliances are also launching out on work which I believe will solve the difficulties of cooking, heating, and lighting in those new buildings. That is a matter on which, I think, we in this Industry should heartily congratulate ourselves.

When I was speaking at our annual gathering last year, I said that the Government were always asking us to dine, but never mentioned the day. You all know, however, that during the last session the Government introduced a Bill, now an Act, dealing with certain questions regarding the Gas Industry. The banquet we went to was a good banquet. The menu included "Soup le Surprise"—in the introduction of the Kettering clause; but there was an absence of the *pièce de résistance—i.e.*, minimum charges. But we are thankful for what we got, though we did not get all we wanted; we left more or less satisfied, but still a little hungry, and we hope that the House of Commons and the Government will see fit to redress these things in the future.

The CHAIRMAN proposed the toast of "The Guests," to which Mr. JAMES F. RONCA, O.B.E. (Director of Gas Administration, Board of Trade), responded.

The Evolution of the Sinusoidal Diagram and Horizontal Illumination Charts.—*Concluded from p. 62.*

(2) The test-point illumination with a given fitting may be determined as follows: Assume this fitting to be the lamp whose candle-power distribution forms the subject of the model, fig. 1. The candle-power at the vertical angle $\phi = 77°$ is, for the azimuthal angle $a_1 = 2°$, 470, and for the azimuthal angle $a_{t_2} = 20\frac{1}{2}°$, 300. The total candle-power directed to the test-point is therefore 470 + 300 = 770. A line (unbroken in fig. 3) is drawn from the point 18 on Scale H, to the point 770 on the oblique Scale $I\,\phi\,(a_1) + I\,\phi\,(a_2)$. A second line is then drawn from the point 77 on Scale ϕ, parallel to the first line. This intersects the oblique Scale E_t at 0·027, which is the required test-point illumination in foot-candles.

The calculated figures are compared with those obtained from the chart, in Table (1).

TABLE 1.

		Calculated.		From Chart.
$a_1 = \sin^{-1} 3/77{\cdot}45$	=	2°	..	2°
$a_2 = \sin^{-1} 27/77{\cdot}45$	=	20½°	..	20½°
$\phi = \tan^{-1} 77{\cdot}45/18$	=	77°	..	77°
$\Sigma I\phi = \frac{E_t H^2}{\cos^3\phi} = \frac{0{\cdot}02 \times 324}{0{\cdot}0114}$	=	568	..	570
$E_t = \frac{I\phi \cos^3\phi}{H^2} = \frac{770 \times 0{\cdot}0114}{324}$	=	0·0271	..	0·027

Other charts have been developed in the Parkinson Laboratories, for the simplification of iso-lux diagram preparation, and the calculation of average illumination, but I have not the time to demonstrate these. Sufficient has perhaps been said to show that nomographic methods may be usefully applied to the simplification of street-lighting calculations, or, as one user of the charts has put it, "to take the sigh out of scientific illumination."

Estimation of Carbon Monoxide in Gas.

At the recent conference of German Gas-Works Chemists, according to *Das Gas- und Wasserfach*, 1934, 77, 562 (Aug. 18), Dr. Brückner and Dipl.-Ing. Gröbner reported on the efficiency of various types of cuprous chloride solution in the estimation of carbon monoxide in gas. Both the velocity of absorption and the absorptive capacity are comparatively low in the case of the ammoniacal solution, and addition of ammonium chloride does not improve matters. The acid solution has a greater velocity of absorption but a lower absorptive capacity. The best conditions as regards both factors are obtained with a *neutral* solution of cuprous chloride in presence of ammonium chloride. A further advantage is that the carbon monoxide is more firmly retained and that neither acid nor alkaline vapours are disengaged. With the solution, the exact composition of which is not yet available, pure carbon monoxide is quantitatively absorbed when the gas is passed 4 to 5 times through the absorption pipette. The solution is, however, obtainable from the Gasinstitut of Karlsruhe.

Engineering Drawing Practice.*

This work is nominally a second edition of "Mechanical Drawing Standards," published by the Council of the Australian Institution of Engineers in 1926, which received a remarkably cordial welcome. It was thus decided (largely as the result of requests and suggestions received) to widen the scope of the work so as to embrace the drawing practice of all the main branches of engineering, and also to modify the recommendations made in the first edition where experience showed this to be desirable.

Among the various subjects dealt with in this book, the following chapter headings may be quoted as exemplifying the scope of the work: Sizes of sheets; title blocks; dimensioning; sectioning and symbols for materials; scales; screw threads, bolts, nuts, &c.; structural steelwork; concrete, plain and reinforced; gauges; welds, pipe, symbols; engineering survey plans; abbreviations, &c. From these it will be readily appreciated that the book will form a valuable addition to the library of those engaged in drawing office practice, and considerable benefit should accrue to the engineering industry of Australia by the adoption of standard size drawing sheets and uniform practices in the various features associated with the preparation and interpretation of engineering drawings, and also by the use of these methods for the training of engineering students. This revised and enlarged edition is in fact issued with the object of providing an authoritative source of reference in connection with the subject.

There is an authoritative preface by Sir Henry Barraclough, K.B.E., Dean of the Faculty of Engineering, University of Sydney, in which he emphasizes the advantages of adopting standard drawing office practice throughout the Commonwealth. Special attention has been given to the methods adopted in Great Britain as set out in "British Standard Engineering Drawing Office Practice," while an examination was also made of the published or proposed standards of many other countries. Thus the recommendations made in the pages of this volume represent the considered judgment of the Committee of the Australian Institution of Engineers after painstaking examination of a vast collection of significant data, and, in conclusion, there is this very notable feature as an argument for confidence in adopting the proposals put forward—every important recommendation finally arrived at has been actually tried out on a practical scale in a large drawing office with completely satisfactory results.

* "Recommended Engineering Drawing Practice," published by the Institution of Engineers, Australia, Science House, Gloucester and Essex Streets, Sydney, N.S.W.; price 4s. 6d., postage extra.

French Gas Industry

Review of the 57th Congress of the Union Syndicale de l'Industrie du Gaz en France

(*Concluded from p. 362, Vol. 207.*)

Applications of Gas in the Glass Industry.

M. Joyeux described the use of gas for the manufacture of ampoules, phials, and head-lamps, his paper being illustrated with photographs of the glass working machines and accessories and of the goods in different stages of production.

Whereas a manual worker can make only 100 ampoules per hour, a machine can turn out from 1,000-6,000 per hour. The use of ampoules containing single and accurate doses is much appreciated by the public, and their cost of production has been brought to an extremely low figure by the adoption of gas-fired automatic plant.

Approximately 50 c.ft. of gas are required for the automatic production of one thousand 15 minim ampoules in comparison with 200 c.ft. when they are made by hand. A machine can turn out ampoules of capacity ranging from 15-150 minims. Phials are made in larger sizes, up to 2 oz., in a different form of machine.

A description is given of the semi-automatic manufacture of head-lamps for motor cars involving 28 separate operations, of which 12 are carried out with the aid of gas.

Use of Gas in Touring Cars.

The use of gas as a propellant for touring cars is limited, since only enough gas for a journey of 20-25 miles can be carried. A. Pignot has, however, investigated the possibility of the use of gas for light cars of the 5-10 H.P. class. His solution is to provide equipment for the alternative use of gas or petrol, the latter being employed for long journeys to places where compressed gas is not available, the former being used for journeys in the locality of the compressing plant.

In view of the limited space available in a small car, it is not possible to include a three-way cock and a large mixer as it is in the case of lorries. The method of arranging for the use of gas is therefore as follows: A gas supply chamber fed from the reducing valve of the gas cylinder equipment is fitted with a needle valve. The gas passes the valve and enters a flanged connection inserted in the pipe situated between the petrol flange of the engine and the carburettor. Flow of gas through the valve is controlled by orifices in the valve, and their degree of opening is set by trial, once and for all, by means of a pointed screw. A rod controlling the valve is connected to the accelerator system in such a way that, during normal running, the valve is more or less remote from its seat. A stuffing-box prevents leaks at the point of entry of this rod. The air is admitted by way of the air inlet of the carburettor in volume depending only on the suction created by the engine. Working is satisfactory, while starting is easy so long as the reducing valve is tight—a point easily ensured. A car with a speed of 56 m.p.h. when running on petrol will easily attain a speed of 53 m.p.h. on gas.

A special oil pipe is provided to entrain drops of oil into the gas and secure satisfactory upper cylinder lubrication. Two cylinders of gas are fitted at the back of the car.

Ageing of Road Tars.

L. Sabrou, having investigated the factors concerned in the ageing of road tars, concludes that ageing is a result primarily of the evaporation of the volatile constituents of the tar. Oxidation plays only a minor rôle, its effect being less than one-hundredth of that due to evaporation. Polymerization, due to the action of heat or solar radiation, is not a factor.

An ageing index is proposed and is determined by a test involving the exposure of a thin layer of the tar to an ultra-violet lamp under standard conditions. Determinations of the viscosity of the tar before and after exposure and of the resulting loss of weight are made.

$$\text{Ageing index} = \frac{\text{Viscosity after test—Viscosity before test}}{\text{Percentage loss of weight}}$$

A high ageing index is regarded as desirable.

Experiments on air-blown tars and on filled tars lead to the conclusion that air-blown tars offer no advantages over dehydrated tars, but that the use of carbonaceous fillers—*e.g.*, coal—is advantageous.

Composition of the Benzoles Recovered from Coal Gas and Carburetted Water Gas.

What is possibly the most complete investigation so far carried out on the composition of benzoles of different origin formed the theme of a paper by R. Delsol. The benzole produced at Gennevilliers is derived from gas made in inclined chambers, vertical retorts, and carburetted water gas plant. In practice, the mixed gas is treated for benzole recovery by scrubbing with gas oil. For the investigation, samples of the benzole contained in the individual gases and in the mixed gas were obtained by use of an activated charcoal scrubber. These samples were analyzed in addition to a sample of the crude benzole as made. An improved method of analysis was devised and was employed for the determination of the unsaturated constituents and the individual hydrocarbons of the aromatic, paraffin and naphthene series. The results were presented in detail.

Benzole and the Gas Industry.

After a brief account of the history of benzole recovery in France, J. Bing discussed successively the technique of benzole recovery, the disposal of the recovered benzole, the characteristics of motor benzole, and the economics of benzole recovery.

The restrictions and taxation to which benzole is subjected in France are such that benzole recovery is not remunerative. Consequently, benzole is recovered in gas-works solely in the national interest. The tax to which benzole in transit is subjected is one of the factors which prevents gas-works from preparing chemically pure or commercially pure products. Hence, in general, only motor benzole is made at gas-works, since benzole in this form is always readily marketable near the works.

Some Results from the Suggestion Box.

A. Sellié referred to the fruitful results which followed the adoption of the suggestion box system in the various works of the Compagnies Réunies de Gaz et d'Electricité in 1931. The instructions affixed to the notice board at each works indicated that the scope of the suggestions was unrestricted, but that a special welcome would be extended to suggestions covering improvements in working and safety conditions in the works, increased productivity, improved working and operating methods, economies in raw materials, power, and labour, improvements in relationships with clients, and reductions in working costs. Cash awards would be made to the originators of useful suggestions in amount depending on their importance, and such suggestions would also be taken into account when promotions were considered.

In three years 100 suggestions were received. They emanated from all grades of the staff, which numbers upwards of 4,000. Awards were made in respect of 54 of the suggestions, the remainder being either impracticable, of no interest, or lacking in novelty. The proportion of useful suggestions was approximately equal for the various types of employees—engineers, foremen, general staff, and workmen—and the smaller works were as productive of ideas as were the larger ones. Awards are made in July each year. In respect of the 82 suggestions received up to June 30, 1933, payments totalling 23,500 francs and ranging from 100 to 3,000 francs were made. Some of the suggestions provided subject-matter for patents.

A brief description of a few typical suggestions was given. Among these may be mentioned:

(1) A method for affixing the mouth-pieces of horizontal retorts so as to avoid fracturing the ends of the retorts.
(2) A vessel for re-charging consumers' meters with water and including a compartment for a flash lamp and spare washers.
(3) A device for speeding up the cleaning of ascension pipes.
(4) A device for gradually diminishing the volume of steam supplied to an intermittent chamber during the steaming period, and leading to the production of water gas of uniform quality.
(5) Means for the internal tarring of mains.
(6) An appliance for automatically loading the station governor so as to maintain a constant pressure at the centre of the distribution system.

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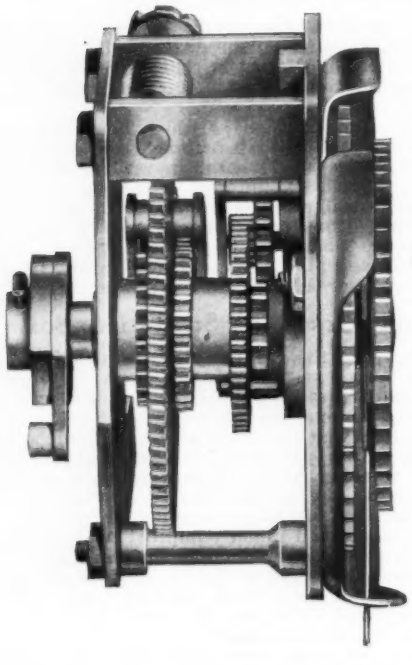

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Gas Undertakings' Results.

Coatbridge.

The statement of accounts and balance sheet of the Coatbridge Gas Company for the year ended June 30, 1934, states that the sales of gas for the twelve months amounted to 1,343,022 therms. The Directors recommended the payment of final dividends at the rates of £9 5s.% actual on the original stock, and £6 9s. 6d.% actual on the four issues of £10 shares, all less income-tax, payable on and after Sept. 13.

Dublin.

The statement of accounts and report of the Directors of the Alliance and Dublin Consumers' Gas Company shows that during the year ended June 30, 1934, the gas made totalled 6,205,875 therms, including 501,476 therms of carburetted water gas. The gas sold amounted to 6,137,474 therms, of which 126,892 therms were used for public lighting. Receipts from the sale of gas were £267,443, from residuals £64,982, and from fittings, &c., £5,541. On the revenue account there is a profit of £67,028 and, after providing for the interest on debenture stock and temporary loans, income-tax, and depreciation of investments, on the general account there remains the sum of £53,446, to which must be added the sum of £28,635, being the balance brought forward from the last account, making a total of £182,081. The Directors recommended the declaration of a dividend at the rate of £7%, less income-tax, on the consolidated ordinary stock of the Company. This absorbed the sum of £54,315, after which a balance of £27,765 remained to be carried to the next account.

Elgin.

The annual report of the Engineer and Manager of the Elgin Gas Department shows an increase in the amount of gas sold of 3,980,700 c.ft. The gross profit of the Undertaking was £4,494, an increase of £13. The net profit increased by £166, to make the net credit balance £4,329. After considering the estimates for 1934-35, the Council decided to reduce the price of gas by 2d. per 1,000 c.ft., or 0·42d. per therm, the price now being 3s. per 1,000 c.ft., or 7·58d. per therm for ordinary purposes, and 2s. 6d. per 1,000 c.ft., or 6·31d. per therm, less 5% discount, for industrial purposes.

Glasgow.

The annual report and balance-sheet of the Glasgow Gas Undertaking, which embraces the year from June 1, 1933, till May 31, 1934, shows that the gross revenue amounts to £1,571,213, and the gross expenditure to £1,260,533, to which is added depreciation written off capital assets, leaving a balance to be carried to profit and loss account of £281,801. After providing for annuities on stocks, interest on borrowed money, and sinking fund, &c., there was left a surplus on the year's operations of over £80,038, as against £75,909 for the previous year. The quantity of coal carbonized during the past year was 549,999 tons, as compared with 548,299 tons for the preceding year, an increase of 1,700 tons. The quantity of gas made per ton of coal carbonized was 15,348 c.ft., which, with water gas, gave an average of 15,796 c.ft., as compared with 15,474 c.ft. and 15,900 c.ft. respectively per ton for the previous year. The quantity of gas delivered and accounted for during the year amounted to 8,708,911,157 c.ft., as compared with 8,661,163,042 c.ft. for the preceding year, an increase of 47,748,115 c.ft., equal to 0·551%. The unaccounted-for gas during the year was 7·47%. The maximum daily make of gas was 36,028,000 c.ft. The net sum realized from the sale of coke this year amounts to £131,774, being £19,736 more than that of the preceding year. The number of ordinary meters in use on May 31 last was 190,266, as compared with 191,958 for the preceding year, a decrease of 1,692. The number of prepayment meters in use on May 31 last was 139,291, as compared with 132,656 for the preceding year, an increase of 6,635, giving a net increase of 4,943 meters. During the year 13,103 meters were repaired at workshops. At the end of the year under review there were on loan a total of 282,716 appliances, as compared with 290,203 for the preceding year.

Largs.

The report of Mr. William Marshall, the Engineer of the Largs Gas Department, states that the amount of gas made in July totalled 5,393,700 c.ft., being an increase of 292,200 c.ft. From April 15 last the amount was 13,858,500 c.ft., an increase of 505,800 c.ft. The Gas Committee is to lay a new main in Barend Street, to cost £70. The gasholders are to be painted at a cost of £52.

Stalybridge.

The financial statement of the Stalybridge Gas Department showed a gross profit of £7,840 and a net profit of £487, compared with a gross profit of £9,317, and a net profit of £1,521 for last year. The expenditure for the year amounted to £25,373, whereas last year it was £24,228; the income was £33,214 compared with £33,545. There was no alteration in the price of gas, but on account of a decrease in the quantity of gas used by ordinary domestic consumers and an increase by industrial users, there is shown a decrease in the income from the sale of gas. The average price received for all gas was 40·8d. per 1,000 c.ft., or 8·1d. per therm, compared with 41·88d. per 1,000 c.ft., or 8·377d. per therm. The gas sold amounted to 142,567,700 c.ft., compared with 140,346,800 c.ft., showing an increase of 2,220,900 c.ft., equal to 1·58%, compared with an increase last year of 799,900 c.ft., or 0·55%.

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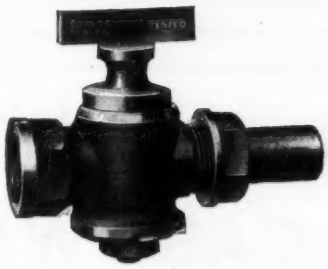

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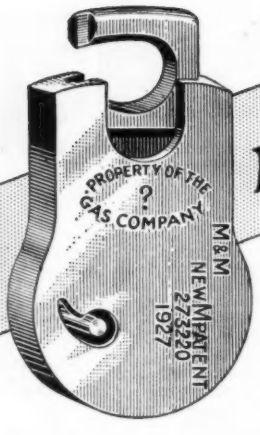

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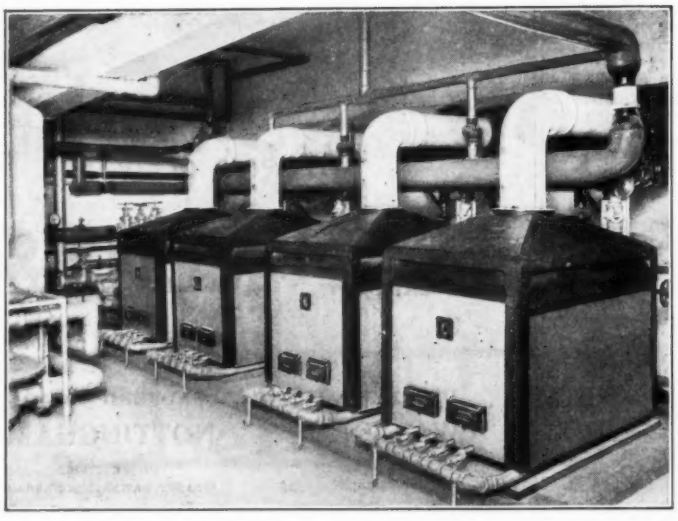

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Gas Markets and Manufactures

Stock Market Report.

[For Stock and Share List, see later page.]

The anticipated autumn revival of business on the Stock Exchange appeared to have begun in earnest last week and prices generally were on the upgrade. This was especially the case in the Industrial market where several substantial increases occurred, though some irregularity set in at the close on account of profit-taking. Despite the large amount of speculative buying the gilt-edged market was well supported, and here again values for the most part showed further appreciation. The enormous amount of money available for investment is evidenced by the overwhelming success attending new issues. These last week included two corporation and two industrial issues, all of which were considerably oversubscribed within a few minutes of the lists opening, and now stand at a premium.

The Gas Market was no exception to the prevailing conditions. The volume of business was heavier and several stocks were quoted higher. In one case, that of Bournemouth sliding-scale, the increase was substantial, being 13 points up at 227½, while business was recorded at 230. The Company's 3% debenture stock also improved by 3 to 85½. On the local Exchange, Bristol 5% maximum hardened again to 120 (yielding £4 3s. 4d.%), the highest price for any 5% maximum stock in the list and almost comparable with the Company's 5% irredeemable debenture. While dealing with 5% maximum stocks, it may be worth noting that there are several others which are not so highly priced at the present time on which the yields are quite attractive—*e.g.*:

—	Price.	Yield % per Annum.
		£ s. d.
Croydon	109½	4 11 4
Newport (Mon.)	106	4 14 4
Northampton	104½	4 15 8
Portsmouth	107½	4 13 0
Southampton	114½	4 7 4

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *Oct.* 1.

There are few alterations to report in the tar products market.

Pitch is somewhat easier at about 55s. per ton f.o.b.

Creosote is firm at 4d. to 4¼d.

Refined tar, 4d. to 4¼d. per gallon in bulk at makers' works.

Tar spirits are steady, with pure toluole at about 2s. 2d., pure benzole 1s. 9d. to 1s. 10d., and 95/160 solvent naphtha at about 1s. 7d. Pyridine is a little easier, at about 7s. for the 90/160 grade. All prices are per gallon naked at makers' works.

Tar Products in the Provinces.

Oct. 2.

The average prices of gas-works products during the week were: Gas-works tar, 25s. to 30s.; Pitch—East Coast, 52s. 6d. to 55s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 52s. 6d. to 55s.* Toluole, naked, North, 1s. 7d. to 1s. 9d. Coal-tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 6d. Heavy naphtha, North, 9¾d. to 10¾d. Creosote, *ex* works, in bulk, North, liquid and salty, 3⅝d. to 3¾d.; low gravity, 3⅝d. to 3⅝d.; Scotland, 3¼d. to 3½d. Heavy oils in bulk, North, 3¾d. to 4¼d. Carbolic acid, 60's, 1s. 9d. to 1s. 10½d. Naphthalene, £10 to £11. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. to 3d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Sept.* 29.

Prices continue to hold but only a moderate volume of business is being transacted at present.

Crude gas-works tar.—Actual value is 33s. to 35s. per ton *ex* works in bulk.

Pitch.—Inquiries are scarce, but value is unchanged at round 45s. per ton, f.o.b. Glasgow for export, and 42s. 6d. per ton *ex* works in bulk for home trade.

Refined tar is quietly steady at 3d. to 3¼d. per gallon in buyers' packages at makers' works.

Creosote oil.—Distillers are well sold on contract. B.E.S.A. Specification oil is 4d. to 4½d. per gallon; low gravity, 4½d. to 4⅝d. per gallon; and neutral oil, 4¼d. to 4½d. per gallon; all f.o.r. in bulk.

Cresylic acid.—A fairly regular business is being conducted at present. Pale, 97/99%, is 1s. 3d. to 1s. 4d. per gallon; dark, 97/99%, 1s. 0½d. to 1s. 1½d. per gallon; and pale, 99/100%, 1s. 4½d. to 1s. 5½d. per gallon; all *ex* works.

Crude naphtha is scarce, with value steady at 4½d. to 5d. per gallon according to quality.

Solvent naphtha.—90/160 grade is 1s. 3d. to 1s. 4d. per gallon, and 90/190 grade 8d. per gallon.

Motor benzole.—1s. 5d. per gallon (nominal).

Pyridines.—90/160 grade is now 6s. 9d. to 7s. 3d. per gallon, and 90/140 grade 7s. to 8s. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole	0 9	to	0 9½	per gallon at works
Motor ,,	1 3½	,,	1 4	,, ,, ,,
90% ,,	1 4	,,	1 4½	,, ,, ,,
Pure ,,	1 7½	,,	1 8	,, ,, ,,

Contracts Advertised To-Day.

Benzole Recovery Plant.
Ilkeston Gas Department. [p. 92.]

Boosters.
Ilkeston Gas Department. [p. 92.]

Coal.
Chelmsford Gas Department. [p. 90.]

Condensers, Exhausters, Washers, &c.
Ilkeston Gas Department. [p. 92.]

Electric Generating Sets.
Ilkeston Gas Department. [p. 92.]

Gas Oil.
Leeds Gas Department. [p. 90.]

Piping.
Ilkeston Gas Department. [p. 92.]

Purifiers, &c.
Ilkeston Gas Department. [p. 92.]

Recording Calorimeter.
Burnley Gas Department. [p. 92.]

Retorts, Vertical, &c.
Ilkeston Gas Department. [p. 92.]

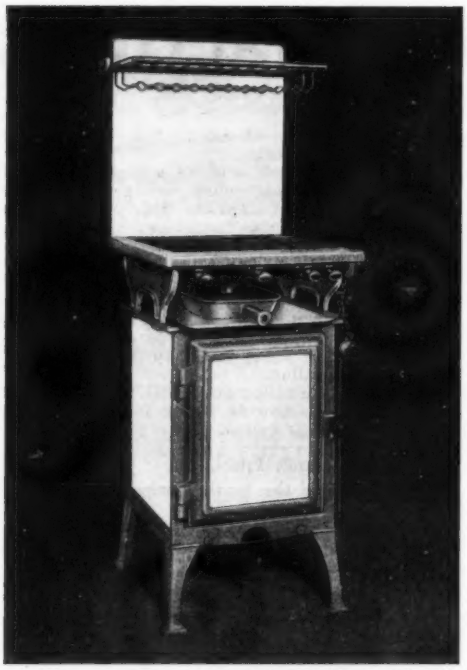
Tar Extractor, Separator, and Tar and Liquid Drains.
Ilkeston Gas Department. [p. 92.]

Successful Year at Peterhead.

Peterhead Gas Department report that the past year had been the most successful in the history of the Undertaking. It was agreed to fix the price of gas at 3s. 11d. per 1,000 c.ft. less discount at the same rates as last year. The quantity of gas manufactured was 81,972,000 c.ft., an increase on the previous year of 2,231,000 c.ft., and the highest output on record. Only £562 had been spent on maintenance of works and plants, compared with £1,014 the previous year. Maintenance of mains and services cost £767, compared with £472 the previous year. The sum of £446 was paid for rates, taxes, and income-tax. The largest of the four holders at the Gas-Works was renewed remote from the Works.

Cirencester's New Plant.

The annual report and statement of accounts of the Cirencester Gas Company, Ltd., for the year ended June 30, 1934, shows a profit on the year's working of £4,453. Interest on the debentures and the interim dividend at the statutory rate have been paid, and the Directors recommended a final dividend at the rate of 14%, 7%, and 9½% on the several classes of shares, making 12%, 6%, and 8¼% for the year. Since the last annual meeting of the Company, a compressing plant has been erected at Stratton and has proved to be very successful in maintaining a steady pressure of gas in that part of the area of supply. For this a sum of £1,550 would be taken from depreciation and renewals fund during the current year. Three years ago the depreciation and renewals fund stood at £2,547, of which only £466 would remain after the holder was paid for.



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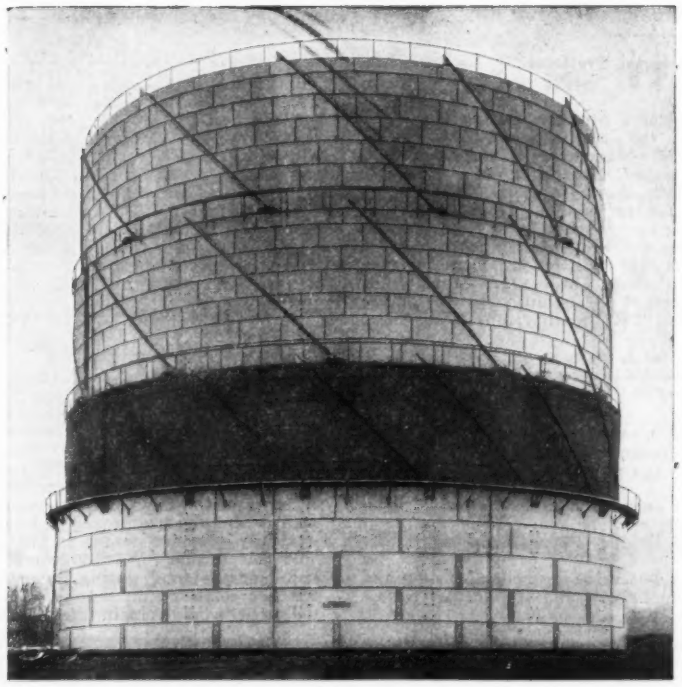

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STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

Issue. £	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. Sept. 28.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
1,551,868	Stk.	Sept. 10	7	7	Alliance & Dublin Ord. ...	132—142	...	...
374,000	„	June 25	4	4	Do. 4 p.c. Deb. ...	90—100	...	98
557,655	„	Aug. 13	7	7	Barnet Ord. 7 p.c.	165—170	...	168
300,000	1	May 7	1/4⅜	1/9⅜	Bombay, Ltd.	27/6—29/6	...	28/9—29/3
178,480	Stk.	Aug. 13	9¾	9¾	Bournemouth sliding scale	225—230	+13	215—230
550,050	„	„	7	7	Do. 7 p.c. max. ...	168—173	+1	170—172½
439,160	„	„	6	6	Do. 6 p.c. Pref. ...	140—145	...	142—146
50,000	„	June 11	3	3	Do. 3 p.c. Deb. ...	88—88	+5	...
262,025	„	„	4	4	Do. 4 p.c. Deb. ...	103—108	...	108
335,000	„	„	5	5	Do. 5 p.c. Deb. ...	122—127	...	...
357,900	„	Aug. 13	7½	7½	Brighton, &c., 6 p.c. Con. ...	161—166	...	...
540,000	„	„	6½	6½	Do. 5 p.c. Con. ...	152—157	...	155
195,500	„	„	6	6	Do. 6 p.c. B. Pref.	142—147	...	...
1,487,500	„	July 9	5	5	Bristol 5 p.c. max.	119—121[a]	+1½	...
120,420	„	June 11	4	4	Do. 1st 4 p.c. Deb. ...	102—105[a]	...	...
217,870	„	„	4	4	Do. 2nd 4 p.c. Deb. ...	102—105[a]	...	...
338,790	„	„	5	5	Do. 5 p.c. Deb.	121—123[a]	...	...
855,000	„	Sept. 24	8	7	British Ord.	158—163*	−2	160—162
100,000	„	June 11	7	7	Do. 7 p.c. Pref.	154—159	...	159
350,000	„	„	5½	5½	Do. 5½ p.c. Pref.	104—109	...	...
120,000	„	„	4	4	Do. 4 p.c. Red. Deb. ...	98—103	...	...
450,000	„	„	5	5	Do. 5 p.c. Red. Deb. ...	107—112	...	...
160,000	„	June 11	5	5	Cambridge 5 p.c. Deb. ...	115—120	...	...
100,000	10	23 May '33	6	4	Cape Town, Ltd.	2—4	...	...
100,000	10	Nov. 6	4½	4½	Do. 4½ p.c. Pref. ...	4—6	...	...
150,000	Stk.	July 23	4½	4½	Do. 4½ p.c. Deb. ...	90—95	...	...
626,860	„	July 23	6	6	Cardiff Con. Ord.	129—133	...	...
237,860	„	June 11	5	5	Do. 5 p.c. Red. Deb.	103—108	...	...
157,150	„	July 23	5	5	Chester 5 p.c. Ord.	113—118[b]	...	...
98,936	1	Sept. 24	2/-	2/-	Colombo, Ltd. Ord.	1⅞—1⅞*	...	...
24,500	1	„	1/4⅛	1/4⅛	Do. 7 p.c. Pref. ...	19/6 - 21/6*	...	...
609,204	1	Sept. 24	-/11'48	-/11'48	Colonial Gas Assn. Ltd. Ord.	19/6 - 21/6*	...	21/—21/9
296,058	1	„	1/3'30	1/3'30	Do. 8 p.c. Pref.	23/6—25/6*	...	25/9
1,775,005	Stk.	July 23	6⅜	5	Commercial Ord.	120 - 125	...	120—121¼
475,000	„	June 11	3	3	Do. 3 p.c. Deb. ...	83—88	...	86½
286,344	„	Aug. 13	5	5	Do. 5 p.c. Deb. ...	120—125	...	124
807,560	„	Aug. 13	7	7	Croydon sliding scale	158—168	...	...
569,590	„	„	5	5	Do. max. div.	107—112	...	...
620,385	„	June 25	5	5	Do. 5 p.c. Deb.... ...	123—128	...	126
542,270	„	Aug. 13	10	7	Derby Con.	177—182[e]	...	...
55,000	„	June 25	4	4	Do. 4 p.c. Deb.	97—100[e]	...	...
209,000	„	Aug. 13	5	5	East Hull Ord. 5 p.c. ...	108—112	...	...
181,625	„	Aug. 13	6	6	East Surrey Ord. 5 p.c. ...	126—131	...	133—134
175,609	„	June 11	5	5	Do. 5 p.c. Deb. ...	120—125	...	...
1,002,180	„	Sept. 10	†7	†5	European, Ltd.	122—127	...	124—126
19,843,763	„	Aug. 13	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	26/6—27/-[f]	...	26/6—26/10½
2,600,000	„	„	3½	3½	Do. 3½ p.c. max. ...	87—90	...	89½—91
4,477,106	„	„	4	4	Do. 4 p.c. Con. Pref. ...	105—108	...	106½ - 107½
6,102,497	„	May 28	3	3	Do. 3 p.c. Con. Deb. ...	87 - 90	...	88—90
3,643,770	„	„	5	5	Do. 5 p.c. Red. Deb. ...	116—119	...	118—118½
3,500,000	„	„	4½	4½	Do. 4½ p.c. Red. Deb. ...	114—117	...	115½—116
270,466	„	Aug. 13	6	6	Harrogate New Cons. ...	127—132	...	...
140,000	1	Sept. 24	1/7½	1/7½	Hongkong & China, Ltd. ...	1⅝—1⅝*	...	...
218,200	Stk.	Aug. 13	6	6	Hornsey Con. 3½ p.c. ...	127—132	...	...
5,600,000	„	May 28	10	14	Imperial Continental Cap.	203—213	+3	206½—212
228,130	„	July 23	3½	3½	Do. 3½ p.c. Red. Deb.	92 - 97	...	...
235,242	„	Aug. 13	8½	8½	Lea Bridge 5 p.c. Ord. ...	165—172	...	...
2,167,410	„	Aug. 13	6	6	Liverpool 5 p.c. Ord. ...	134—136[b]	...	...
245,500	„	June 11	5	5	Do 5 p.c. Red. Pref. ...	101—111[b]	...	...
306,083	„	July 16	4	4	Do. 4 p.c. Deb. ...	101—103[b]	...	...
11,751	„	Aug. 27	10	8	Maidstone 5 p.c. Cap. ..	180 - 190	...	...
63,480	„	June 25	3	3	Do. 3 p.c. Deb. ...	71—76	...	...
75,000	„	May 28	†10	†10	Malta & Mediterranean ...	200—210	...	...
382,000	—	Apl. 3	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	102—105	...	...
231,978	Stk.	Aug. 13	5	5	M. S. Utility "C." Cons. ...	111—116	...	...
818,657	„	„	4	4	Do. 4 p.c. Cons. Pref.	97—102	...	...
360,075	„	June 11	4	4	Do. 4 p.c. Deb. ...	100—105	...	...
148,955	„	„	5	†5	Do. 5 p.c. Deb. ...	119—124	...	...
125,000	—	July 2	...	11/8	Do 3½ p.c. Rd. Rg. Bds.	97—100	...	...
675,000	„	May 28	†6	†13	Montevideo, Ltd.	60—65	...	62
2,061,815	„	Aug. 13	5½	5	Newcastle & Gateshead Con.	25/3—26/-[d]	...	...
682,856	„	„	4	4	Do. 4 p.c. Pref. ...	102½—103½[d]	...	...
776,706	„	June 11	3½	3½	Do. 3½ p.c. Deb. ...	92½—93½[d]	...	...
277,285	„	May 7	5	5	Do. 5 p.c. Deb. '48 ...	105—107[d]	...	...
274,000	„	Aug. 13	5	5	Newport (Mon.) 5 p.c. max.	105—107[a]	...	...
204,940	„	Aug. 13	7½	7½	North Middlesex 6 p.c. Con.	153—158	...	157—158
396,160	„	Aug. 13	5	5	Northampton 5 p.c. max. ...	102—107	...	...
300,000	„	May 7	†9	†7	Oriental, Ltd.	167—172	...	...
416,617	„	June 11	8	8	Plym'th & Stonehouse 5 p.c.	178—183	...	...
504,416	„	Aug. 13	8	8	Portsm'th Con. Stk. 4 p.c. Std	177—182	+2	180½—181½
241,446	„	„	5	5	Do. 5 p.c. max. ...	105—110	...	...
114,000	„	July 23	5	5	Preston 5 p.c. Pref.	101—106	...	...
1,736,968	Stk.	Aug. 27	6	6	Sheffield Cons.	138—140[e]	−1	...
95,000	„	July 9	4	4	Do. 4 p.c. Deb.	100—104[e]	...	...
133,201	„	Aug. 13	5	8⅓	Shrewsbury 5 p.c. Ord. ...	137—142	...	...
90,000	10	May 28	‡4	‡3	South African	2—4	...	...
927,177	1	Sep. 10	1/2‡	1/2‡	South-East'n Gas Cn. Ld. Ord	28/-—29/-	...	29/-
786,061	1	„	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref	21/9—22/9	...	...
450,000	Stk.	Aug. 13	74/4	4	Do. 4 p.c. Red. Deb. ...	101—103	...	...
6,709,895	„	Aug. 13	7	5	South Met. Ord.	137—140	+1	138—139
1,135,812	„	„	6	6	Do. 6 p.c. Irred. Pf.	142—147	...	144—145½
850,000	„	„	4	4	Do. 4 p.c. Irred. Pf.	104—107	...	107
1,895,445	„	June 25	3	3	Do. 3 p.c. Deb. ...	87—90	...	90
1 000,000	„	July 9	5	5	Do. 5 p.c. Red. Deb.	115—118	...	116½—117⅞
209,820	„	Aug. 13	8½	8½	South Shields Con.	169—171[d]	+2	...
1,543,795	„	July 9	6	6	South Suburban Ord. 5 p.c.	133—136	...	134
512,825	„	„	5	5	Do. 5 p.c. Pref.	120—125	...	...
300,000	„	„	4	4	Do. 4 p.c. Pref.	101—106	...	...
868,837	„	June 11	5	5	Do. 5 p.c. Deb.	121—126	...	124½
100,000	„	„	4	4	Do. 4 p.c. Deb.	102—107	...	...
647,740	„	Aug. 13	5	5	Southampt'n Ord. 5 p.c. max.	112—117	...	...
121,275	„	June 11	4	4	Do. 4 p.c. Deb.	99—104	...	...
350,000	„	Aug. 13	5½	5½	Swansea 5½ p.c. Red. Pref.	107—112	...	...
200,000	„	June 11	6½	6½	Do. 6½ p.c. Red. Deb.	102—107	...	...
1,076,490	„	Aug. 13	6½	6½	Tottenham and District Ord.	153—158	...	156½—157½
409,835	„	„	5½	5½	Do. 5½ p.c. Pref. ...	130—135	...	...
62,285	„	„	5	5	Do. 5 p.c. Pref. ...	118—123	...	...
199,005	„	June 11	4	4	Do. 4 p.c. Deb. ...	100—105	...	...
349,110	„	Aug. 13	7	7	Uxbridge, &c., 5 p.c. ...	153—158	...	...
88,330	„	„	5	5	Do. 5 p.c. Pref. ...	115—120	+3	...
1,326,700	„	Aug. 13	7	7	Wandsworth Consolidated	158—163	...	160½—162½
1,371,378	„	„	5	5	Do. 5 p.c. Pref.	120—125	+1	123½—125
1,317,964	„	June 11	5	5	Do. 5 p.c. Deb.	121—126	...	125½—125⅞
208,300	„	„	...	26/8	Do. 4 p.c. Deb.	104—107	...	...
158,400	„	Aug. 13	6g	5	Winchester W. & G. 5 p.c. Con.	115—120	...	...

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. *g.*—Paid £8, including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year.

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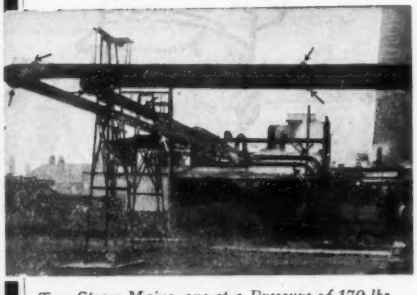
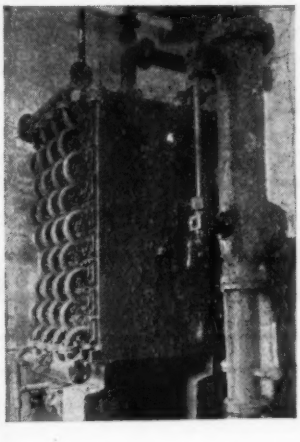


Two Steam Mains, one at a Pressure of 170 lbs. per square inch, the other at 20 lbs per square inch.



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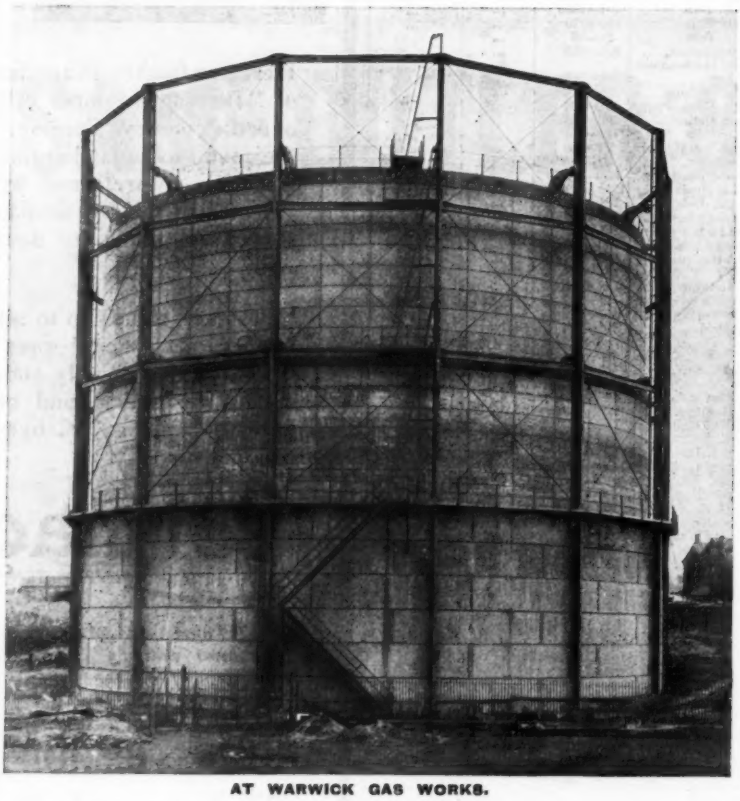

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